TN 839 .J68 v.28 no.1-52

Annual Refinery Number

15 Cents

The OIL and GAS JOURNAL

PRODUCING REFINING ENGINEERING MARKETING

Published Every Thursday TULSA, OKLAHOMA, MARCH 6, 1930 $6.00 a Year

Michigan State Library
A1418-D-7-26-B

THE INTERNATIONAL DERRICK & EQUIPMENT CO. TEXAS
IDECO
BOYKIN GREYHOUND PRODUCTS

STEEL DERRICKS
(GALVANIZED)

IDECO DERRICKS as originally designed were fundamentally right. Although other derricks have been offered from time to time IDECO STEEL DERRICKS still remain THE STANDARD OF COMPARISON

THE INTERNATIONAL DERRICK & EQUIPMENT COMPANY
COLUMBUS, OHIO LOS ANGELES, CAL.

Plants: Columbus, Delaware, Ohio; Houston, Beaumont, Texas; Torrance, California. *Sales Offices:* Columbus, Ohio; New York City, N. Y.; Pittsburgh, Pennsylvania; Tulsa, Oklahoma; Fort Worth, Houston, Texas; Shreveport, Louisiana; Wichita Kansas; Denver, Colorado; Los Angeles, California; Maracaibo, Venezuela. *Warehouses and Yards:* Columbus, Ohio; Tulsa, Seminole, Tonkawa, Maud, Sasakwa, Allen, Oklahoma City, Oklahoma; Wichita Heights, Kansas; Bakersfield, Torrance, California; Houston, Big Spring, Odessa, Pyote, Borger, Mexia, Luling, Grand Saline, Wichita Falls, Orange, Seguin, Texas; Shreveport, Lake Charles, Oil City, Louisiana; El Dorado, Smackover, Arkansas.

Export Offices—74 Trinity Place, New York City; Columbus, Ohio; Houston, Texas; Los Angeles, California. 710

Advertisers' Index on Page 49 Table of Contents on Page 50

ALLEGHENY METAL & ASCOLOY 33

CORROSION controlling alloys . . . . . metals fearing neither the sting of caustics nor the bite of acids.

Tough, strong metals that can stand on their own feet in the construction of heavy equipment, yet cost little, if any more than less able materials.

ALLEGHENY METAL AND ASCOLOY 33 . . . . . both possessing these general characteristics, yet each best suited to solution of specific problems in atmospheric and chemical corrosion. Available in commercial shapes, sizes and forms.

Technical bulletins on request.

Warehouse Stocks
JOS. T. RYERSON & SON, Inc.
Chicago Cleveland Milwaukee St. Louis
Cincinnati Detroit Buffalo Boston
Jersey City

ALLEGHENY STEEL COMPANY
General Offices and Works:
BRACKENRIDGE, PA.

New York Buffalo Cleveland Chicago Detroit
Milwaukee St. Louis Los Angeles

Allegheny

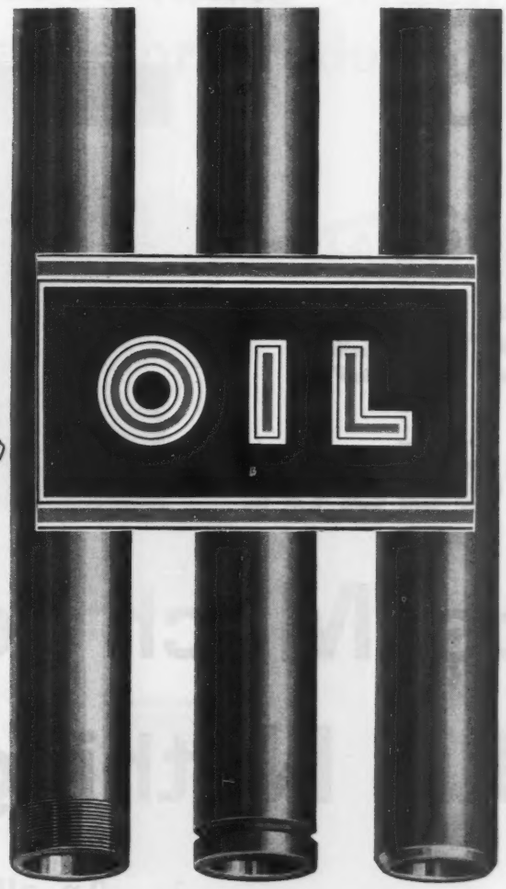
Sheets for Automobile Bodies · Metallic Furniture · Deep Draws Allegheny Metal · Ascoloy · Electrical Sheets · Steel Castings · Boiler Tubes · Pipe

Specify

WALWORTH

C.N.I.

CAST PIPE *for*



● Walworth C. N. I. (Chrome-Nickel-Iron) cast pipe is the solution for many of the oil refinery's problems of pipe corrosion. ● In certain services it offers unusual advantages because it combines the endurance of cast iron with the convenience of other kinds of pipe. ● For you can cut and thread C. N. I. pipe on the job with hand tools and connect it up with regular pipe fittings and valves.

● Send for the C. N. I. Pipe Manual. ● It tells where we recommend the use of C. N. I. pipe — and, with equal frankness, where we do not recommend it.

THREADED for SCREWED COUPLING

GROOVED for VICTAULIC COUPLING

BEVELED for FIELD WELDING

Regularly made up in 5-foot lengths or in two or more welded lengths. Available in 1½" - 2" 2½" - 3" - 4" - 5" and 6" sizes.

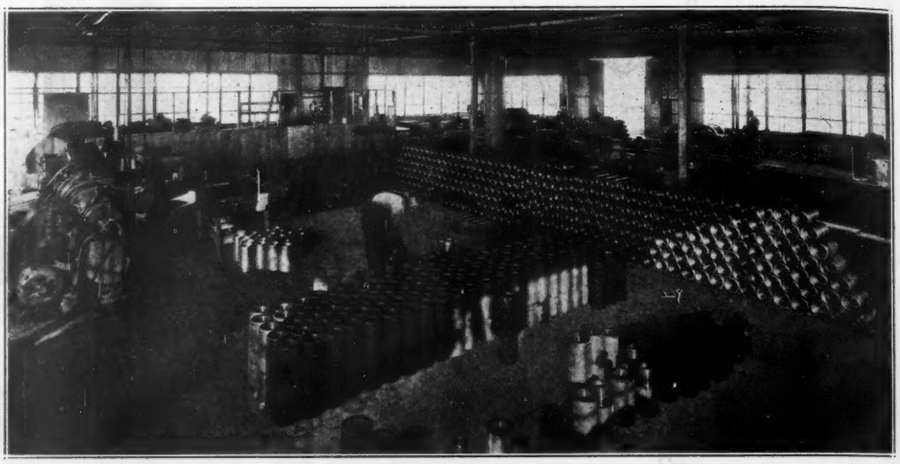
WALWORTH

Walworth Company, General Sales Offices: 60 East 42nd St., New York
Plants at Boston, Mass.; Kewanee, Ill.; Greensburg, Pa.; and Attalla, Ala.
Walworth Company Limited, 620 Cathcart St., Montreal, P. Q.
Walworth International Co., 11 Broadway, New York, Foreign Representative
. . . Distributors in Principal Cities of the World . . .

The Oil and Gas Journal, issued weekly by The Petroleum Publishing Company, 114-116 West Second Street, Tulsa, Oklahoma. Subscription price $6.00 a year; 15 cents a copy. Entered as second-class mail matter December 15, 1911, at the post office at Tulsa, Okla., under the Act of March 3, 1879.

SPENGLER

on a Steel Product



Tool Joint Department—SPENGLER Tool Co.

Adds Much to the Quality—

—But Nothing to the Price!

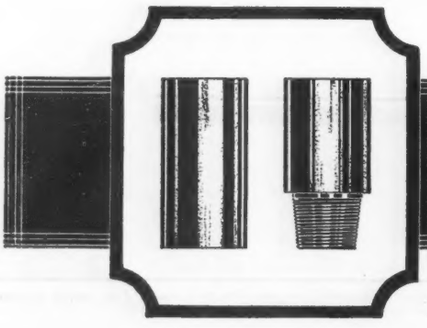
Four Reasons

1—An alloy made according to tested SPENGLER specifications.

2—Threading accurately done by men skilled in the operation of precision machinery.

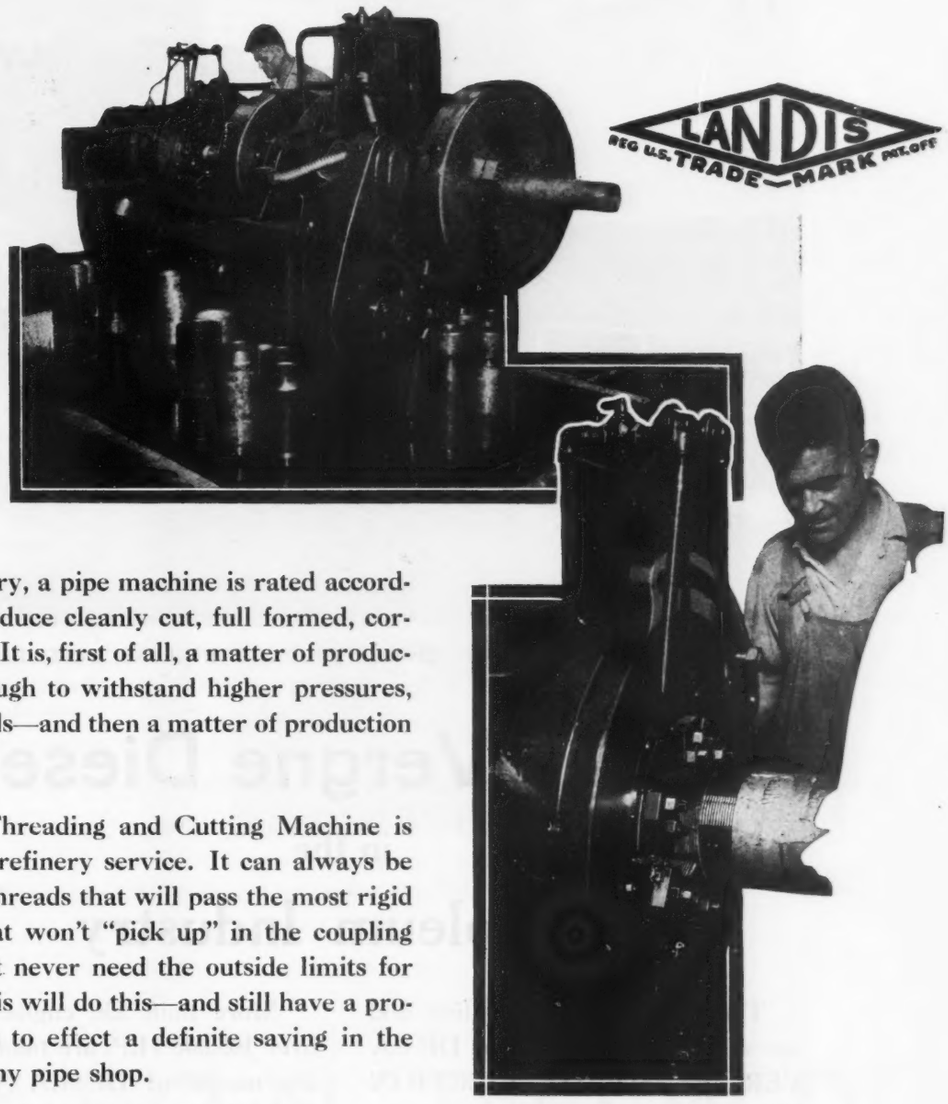
3—Heat Treated, and tempered to give the required tensile strength so essential in drilling tools.

4—Tested and stamped with the SPENGLER mark to insure ingrained quality.



SPENGLER TOOL CO.
OKLAHOMA CITY, OKLAHOMA
SPENGLER TOOL JOINTS MEET A.P.I. SPECIFICATIONS

The LANDIS Pipe Threading Machine Is Ideal for Maintenance or Production



With the Oil Industry, a pipe machine is rated according to its ability to produce cleanly cut, full formed, correctly tapered threads. It is, first of all, a matter of producing threads strong enough to withstand higher pressures, heavier strains and loads—and then a matter of production costs.

The Landis Pipe Threading and Cutting Machine is designed for field and refinery service. It can always be depended upon to cut threads that will pass the most rigid inspection—threads that won't "pick up" in the coupling or fitting—threads that never need the outside limits for form or taper. A Landis will do this—and still have a production cost so low as to effect a definite saving in the operating expense of any pipe shop.

The Pipe Shop that is equipped with Landis Pipe Threading and Cutting Machines produces better threads—and at a sufficient saving in operating expense to discount promptly the slightly higher initial cost of Landis equipment.

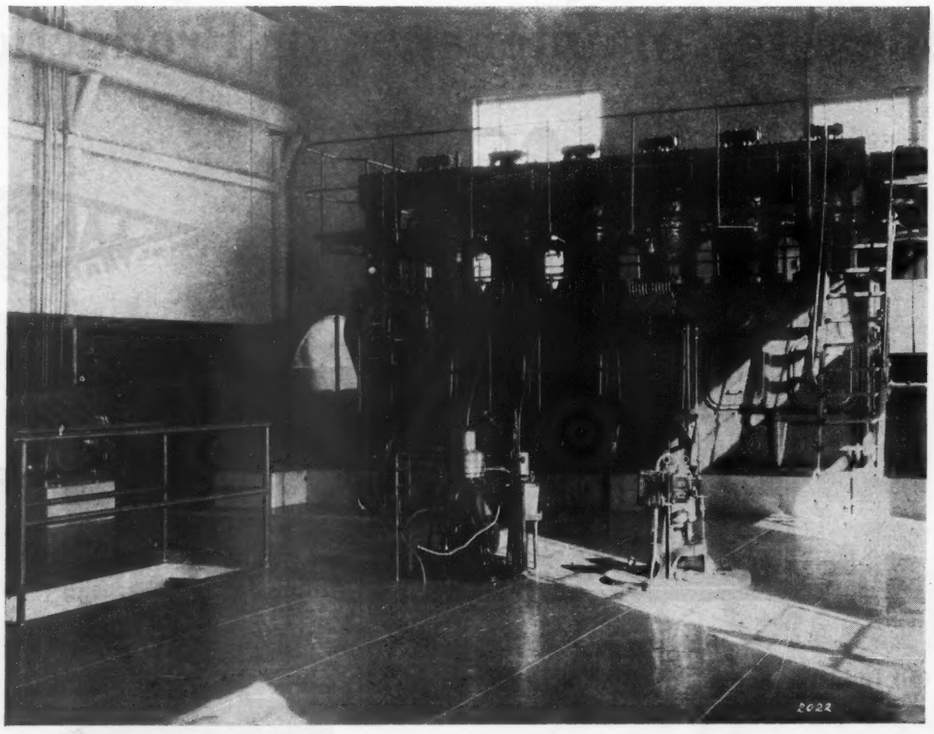
May we send you the details? Write today for catalogue No. 31.

LANDIS MACHINE COMPANY, Inc.

Waynesboro, Penna., U. S. A.

Detroit Office—5928 Second Blvd.
Cleveland Office—504-505 Marshall Bldg.

REPRESENTED IN THE DOMESTIC OIL FIELDS BY: Colcord-Wright Machinery & Supply Co., St. Louis, Mo.; D. S. Mair Machinery Co., Houston, Tex.; Woodward, Wight & Co., New Orleans, La.; Herberts Machinery & Supply Co., Los Angeles, Calif; Herberts Moore Machinery Co., San Francisco, Calif.; Hendrie & Bolthoff Mfg. & Supply Co., Denver, Colo.



600 H.P. SOLID INJECTION DE LA VERGNE PIPE LINE INSTALLATION

De La Vergne Diesels

in the

Petroleum Industry

The simplicity of operation and low maintenance cost of the DE LA VERGNE SOLID INJECTION DIESEL in this major industry are proven by more than 125 repeat orders from 23 customers in this field.

More than 530 engines totaling over 105,000 H.P. are today proving the merits of DE LA VERGNE SOLID INJECTION DIESEL ENGINES over any other kind of prime mover for this exacting service.

I. P. Morris & De La Vergne, Inc.

RICHMOND & NORRIS STS. -:- PHILADELPHIA, PA.

Branch Offices:

33 Rector St., New York, N. Y.
American Trust Bldg., Birmingham, Ala.
615 Mills Bldg., El Paso, Texas
1016 Second National Bank Bldg., Houston
1302 Lynch Bldg., Jacksonville, Fla.
608 Land Bank Bldg., Kansas City, Mo.
Railway Exchange Bldg., St. Louis

Pumping Gasoline at 625 lbs.

The Dayton-Dowd high pressure pump illustrated is installed in one of the large western refineries for gasoline pipe line service.

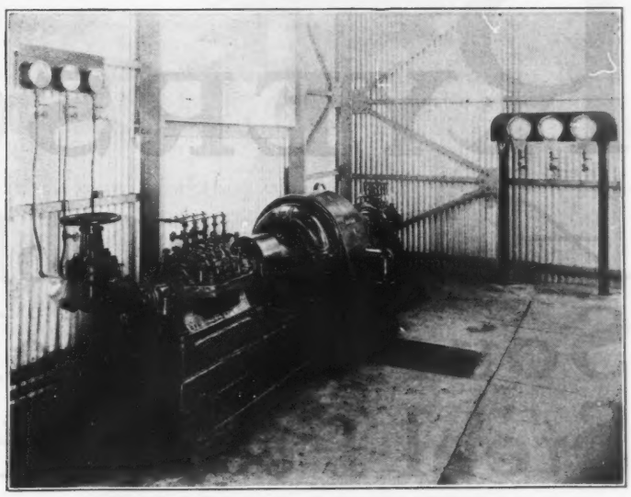
This unit delivers a capacity of 230 G.P.M. at 625 lbs. pressure, pumping 54° Be., .761 Sp. Gr. gasoline.

These pumps are equipped with the patented double-port automatic balance device perfected by Dayton-Dowd. The balancing action is positive and effectual. Thrust bearings are entirely eliminated.

Both the stuffing boxes are low pressure which eliminates packing difficulties and leakage of gasoline.

Dayton-Dowd pumps will satisfy the most exacting. Their designs cover every refinery pumping service, both hot and cold processes.

Write for bulletins or ask to have a Dayton-Dowd sales engineer call.



Installation of Dayton-Dowd Gasoline Pipe Line Pumps for Prominent Refinery on West Coast

DAYTON-DOWD

CENTRIFUGAL PUMPS

WORKS: QUINCY, ILLINOIS

OIL FIELD REPRESENTATIVES

Chicago	30 North Michigan Ave.—State 5913	Los Angeles	American Bank Building—Mutual 2357
Oklahoma City	Local Building—3-0908	San Francisco	7 Front St.—Douglas 8793
Tulsa	301 Commercial Building—2-1471	New Orleans	American Bank Building—Main 2225
Houston	20 National Bank Building—Fairfax 0800	St. Louis	2211 Olive St.—Central 2815
Dallas	309 North Market St.—2-1451	Kansas City	2712 McGee St.—Harrison 5212

RYERSON

A Dependable Source for all Steel Products

An organization built up through more than three-quarters of a century of business • • • • Providing nation-wide service from nine strategically located plants • • • • With more than 175,000 tons of steel and allied products on hand for immediate shipment • • • • You can call on Ryerson for any shape, size or kind of steel with full assurance that there will be no waiting or delay.

Use the Ryerson Journal and Stock List as your guide in buying steel. Write for current issue.

JOSEPH T. RYERSON & SON INC.

Plants: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City

Representation in: Minneapolis, Rockford, Kansas City, Tulsa, Houston, Newark, New York, Denver, Los Angeles, San Francisco

Structural Steel
Immediate Shipment of all standard sizes, cut to length.
Structural "I" Beams
Structural "H" Beams
Angles—H Columns
Channels—Plates
Tees—Zees
Girder Beams

Bar Stocks
Mild Steel
Cold Finished
Refined Iron
Reinforcing
Forging
Screw Stock
Turned Ground and Polished Shafting
Free Cutting
Stem Rounds
Alloy Steel
Tool Steel

Special Steels
Alloy Steels—S.A.E. Specifications
Ryolite Tool Steel in different analyses meeting the various tool steel requirements.
Ryolite "4 Point" Chisel Steel.
Allegheny Metal, a SUPER Corrosion resisting metal.
Nikrome Armco-Special Heat-treated Alloys.

Special Sheets
"C" Pickled
Single Pickled
One Pass Cold Rolled
Galvanized
Blue Annealed
Patent Leveled
Tool Steel
Extra Deep Stamping
Uniform Blue
Vitreous Enameling
Wellsville Polished
Partition
Bill Poster
Armco Iron
Terne Plate
Allegheny
Electrical

Building Products
Reinforcing Steel and Accessories.
Metal Lath
Expanded Metal
Wire Mesh
Spirals
Steel Joist
Plastering Channels
Corner Bead
Base Screed
Picture Mold

Other Special Lines
Strip Steel
Bolts and Nuts
Welding Rods
Floor Plates
Boiler Tubes and Fittings
Steel Grating
Stair Treads
Tag Protectors
Turnbuckles
Wire—Rivets
Glyco Babbitt—Five grades meet all the varying needs of industry.
Solder

Machinery
Machine tools and metal-working equipment of all kinds including
Lathes—Drills
Shapers—Grinders
Punches & Shears
Milling Machines
Friction Saws
Horizontal Boring Drilling and Milling Machines
Welding Equipt.
Bending Rolls
Small Tools, Etc.

RYERSON STEEL SERVICE

THE CELEBRATED SKIP TOOTH DIE

(*Genuine Nye*)

REG. U. S. PAT. OFFICE

A LETTER FROM HARRY G. NYE

TO THE OIL MEN OF THE U. S. A.

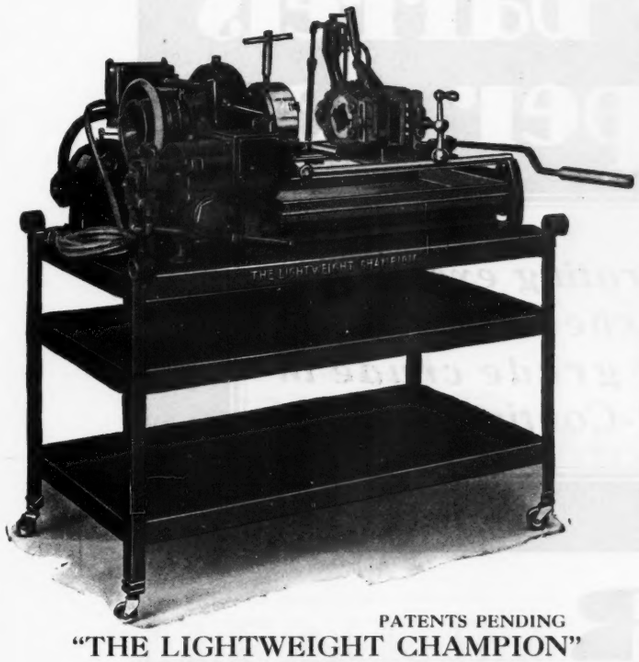
WHAT WE NEED IS MORE PANTS BUTTONS

FELLOW CITIZENS:

I see that women are taking up sewing again. Men have never quit—wild oats, I mean. But women are taking to sewing with an "e". You know women have been getting along with hardly a stitch. I mean taking a stitch, of course. They have bought ready-made about everything they wore. That wasn't much. It was different when I was young, and it's a good thing.

In those days women made about everything they wore, and they wore about everything in those days. In those days a woman had a pair of trunks full of skirts. Now about all she has is a pair of trunks, and one skirt. Or so I have been told by the traveling men. Clothes are a good old custom, and I am glad to see them coming back.

My mother made about everything she wore, and made over about everything I wore. She could take an old suit of my father's, and by putting the front of the vest where the seat of the pants used to be, she could fix it over for me so you would hardly know, except for the soup stains. Joseph divided his coat among his brethren. Mother did the same with Pa's pants.



So women have gone back to sewing. I am glad to hear it, or will be when I am sure just what. What I want to know is whether it is doilies or pants buttons. Doilies are nice, but pants buttons are a necessity. Doilies are all right, but you can't get along without pants buttons. Although, at that, some of us have had to.

So, if women take up sewing, I hope they will take up sewing pants buttons first. It is what you might call an essential industry. I can't think of anything essentialer. (And keep 'em buttoned). This country will never make much progress if a man has to use one hand to hold up his pants all the while. And some men have had to do that, so I have heard.

Yes, sir, buttons are just as much standard equipment on a pair of pants as Nye tools are in a shop. If you are an oil man, when that next big job comes along, don't get caught with your pants down, metaphorically speaking, I mean.

Yours truly,

HARRY G. NYE.

PATENTS PENDING

"THE LIGHTWEIGHT CHAMPION"

POWER PIPE THREADING MACHINE
THREADS, CUTS OFF AND REAMS
CAPACITY ½ TO 2 INCHES

Otherwise Known As

The Nye Tool & Machine Works

4120-30 Fullerton Avenue Chicago, Ill.

Copyright, 1930, by Harry G. Nye. All rights reserved.

NYE TOOLS FOR SALE BY ALL LEADING SUPPLY HOUSES

OMAR REFINING COMPANY

Capacity,

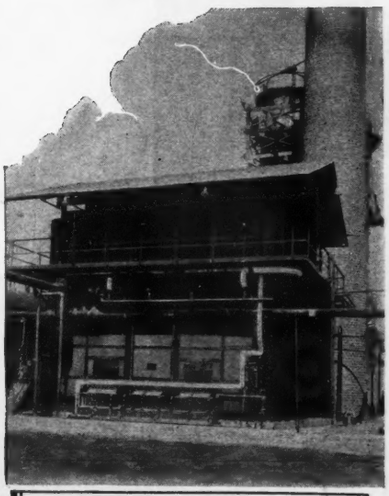
4,000 barrels per day

..Operating exclusively on Garber crude, the highest grade crude in the Mid-Continent Fields.

OMAR
REFINING COMPANY

Roberts Building, Tulsa, Oklahoma - - Northwest Office: Baker Bldg., Minneapolis

A *Small* but *All-Important* Part of *The Lientz Recirculating System*

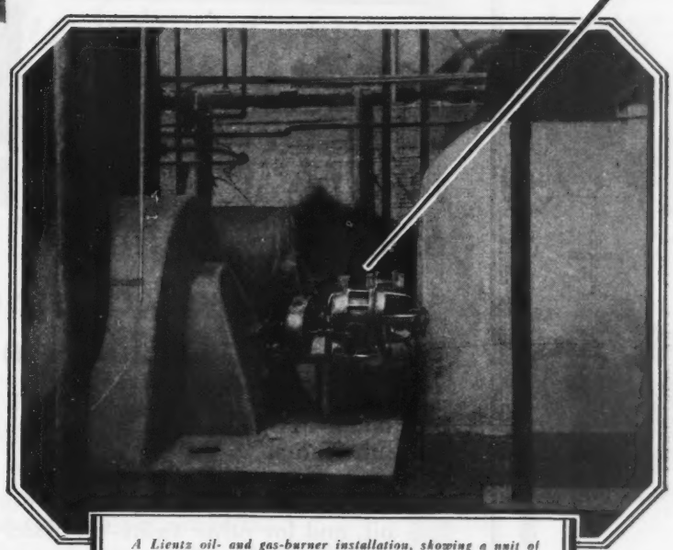


G-E Motors serving hot-gas fans in the Lientz recirculating system

B. P. Lientz & Co. of Kansas City, Mo. manufactures a highly efficient system for recirculating hot flue gases in petroleum refineries. General Electric motors for fan and blower drive are but a small part of the unit. Yet, the success of the entire Lientz System hinges on the performance of these motors.

When asked why G-E motors were selected as standard equipment, B. P. Lientz & Co. answered—"for dependability."

"for dependability"



A Lientz oil- and gas-burner installation, showing a unit of the outside-housing type

Apply the proper G-E motor and the correct G-E controller to a specific task, following the recommendations of G-E specialists in electric drive, and you have G-E Motorized Power. Built in or otherwise connected to all types of industrial machines, G-E Motorized Power provides lasting assurance of performance that builds confidence.

Motorized Power
—fitted to every need

200-324

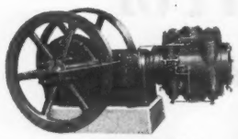
JOIN US IN THE GENERAL ELECTRIC HOUR, BROADCAST EVERY SATURDAY AT 9 P.M., E.S.T. ON A NATION-WIDE N.B.C. NETWORK

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

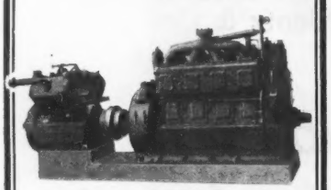
Balanced Angle Compressors Cut Costs on 81% of Industry's Lubricants

From the Sullivan Line

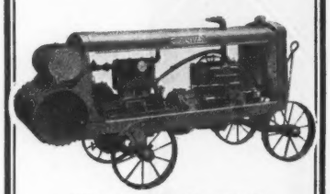


Single Stage Belted Compressor

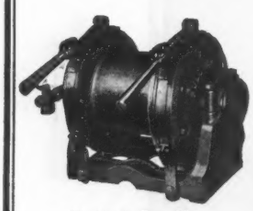
Single Stage Vertical Direct-Connected Compressor



Single Stage Direct-Connected Compressor, Diesel Driven



110-ft. Portable Compressor

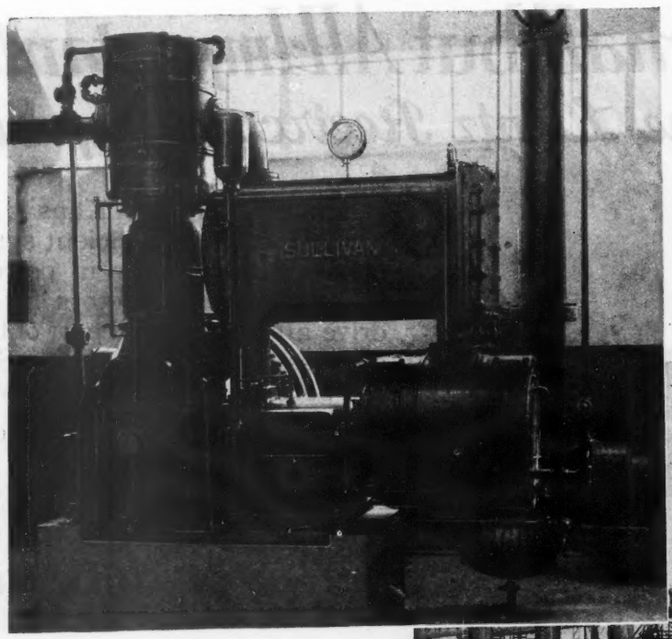


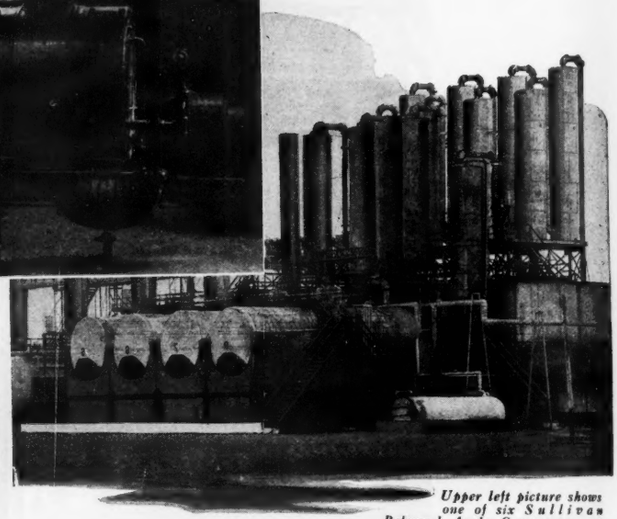
Turbinair Portable Hoist

Clay Spader

Concrete Breaker

Rock Drill





Upper left picture shows one of six Sullivan Balanced Angle Compressors at work for a leading oil company.

Where oil is refined for 81% of America's machinery builders, these distinctive Sullivan Compressors help leaders in the oil industry

COMPRESSED air is an important factor in making cleaner and smoother lubricants.

Its cost, for activating sludge, pumping oil, and for other tasks—is under close scrutiny. Air Compressors are not selected by habit, but by investigation. And it is a tribute to Sullivan Engineering, that refiners of lubricants for 81% of America's metal working plants now use *Balanced Angle Compressors.*

You, too, will find that these Compressors will supply air power for less money in power, maintenance, and floor space — due to Balanced Angle Design, and multi-step control. Let us tell you the complete story.

Sullivan Compressor capacities are 66 to 5100 cu. ft. per min; including single and two stage compressors, and all types of drive.

Send for Catalog 83-J

SULLIVAN MACHINERY COMPANY

Dallas Tulsa 825 Wrigley Bldg., CHICAGO Paris Tokyo

Garber Oklahoma City San Francisco Mexico City Calcutta

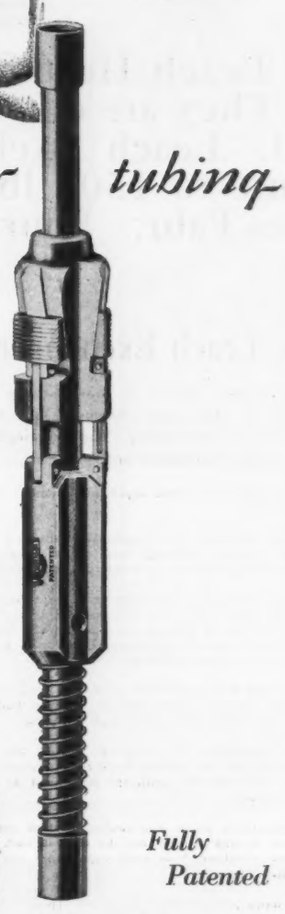
SULLIVAN

Air Power Equipment

A *Safety Valve* PREVENTS STEAM EXPLOSIONS

A GUIBERSON TUBING CATCHER

is no less vital to the Safety of your tubing



The danger of disaster from an explosion of a boiler is averted through the use of a safety valve, which is ever on guard. The even more threatening danger of an accident in your well, resulting in a mass of wrecked and useless tubing, meaning the loss of considerable money and production, can be averted through the use of a Guiberson Tubing Catcher, which has been affording this protection to numberless operators since its introduction to the oil country.

The Guiberson Tubing Catcher stops a string of falling tubing within three inches. To make amply sure that this will take place, every catcher is tested at catching its own weight within that distance when dropped in an empty casing. Every one sent out has passed that test. No fluid is necessary in the hole, because the strong spring operates independently of it. Mud or paraffin do not retard the action of the heavy striker weight. Slips are kept in perfect alignment by dove-tail tracks and guided instantly and accurately to the casing walls. In relation to the value of what it preserves, the Guiberson Tubing Catcher is a most inexpensive safety appliance.

"Better Be Safe Than Sorry"
THE GUIBERSON CORPORATION
Box 1106, Dallas, Texas
California Branch: 1506 Santa Fe Ave., Los Angeles
621 Kennedy Bldg., TULSA | 321 S. Osage St., PONCA CITY | 506 Trust Bldg. NEWARK, O.

Fully Patented

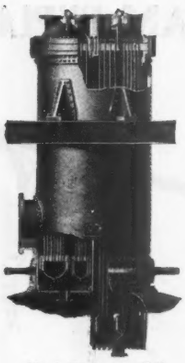
GUIBERSON

BETTER BE SAFE THAN SORRY

HEAT EXCHANGERS

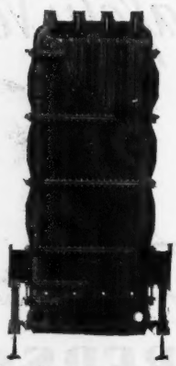
Built for Oil

High Pressure Vapor Heat Exchanger

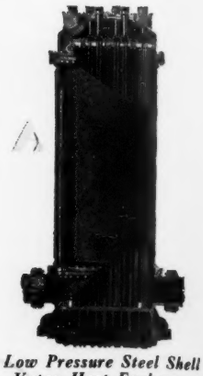


High Vacuum Oil Condenser

Fracto Control TRADE MARK REG.



Low Pressure Cast Iron Vapor Heat Exchanger



Low Pressure Steel Shell Vapor Heat Exchanger

C. H. Leach Heat Exchangers are designed solely for oil refinery use. They are not water heaters or ammonia condensers modified for oil. Leach Exchangers are built for all pressures from 2 mm. absolute to 1500 lbs. per sq. in., and for temperatures up to 750 degrees Fahr. Four of the typical designs are shown above.

Why Leach Exchangers Last

OIL refinery service is more severe than other uses to which heat exchangers are put, and demands special construction. The outstanding features of the Leach Exchangers are—

1—Vertical shell to permit rapid and complete drainage from all surfaces.

2—Integral tube sheet and condensate collection basins. Distillate is drained instantly from the exchanger and no machined surface or joint is below distillate level.

3—Multiple tube bundle to compensate for expansion and contraction. There may be a difference of several hundred degrees between the various vapor passes of a heat exchanger, and it is impossible to prevent buckling of the tubes in a single or two-head exchanger.

4—No through-bolt connecting more than two pieces in high pressure designs. It is difficult to keep both sides of a three-piece joint tight under high pressures.

5—Ready accessibility for cleaning. Every tube in a Leach Exchanger may be reached by a 6-inch scraper. The vapor baffles are removable with the shell, and do not interfere with cleaning.

6—Multiple bleed points and cooling medium connections. A separate cooling medium may be used in each tube bundle, and the distillate from each vapor pass can be removed separately.

7—Wash down ports at top and bottom. These ports are placed diametrically opposite each other so that inspection can be made against a light and so that carbon cleaned from the tubes may be easily flushed from the base.

8—Steaming out connections. A permanent steaming out connection is provided for cleaning the inside of each tube bundle.

9—Ample vapor passages. Low vapor velocities. To avoid erosion from sulphur bearing vapors, it is desirable that vapor velocities be maintained at as low a value as possible. The openings from one vapor pass to the next in the Leach design are at least double the area of the passes.

Leach Heat Exchangers are fully protected by patents in the United States and abroad.

IMPROVE CRACKING PROCESSES

The Leach High Pressure Exchanger is for application in cracking plants ahead of the reflux tower. Savings in fuel up to 25 per cent, 25 to 60 per cent increased capacity, and 3 to 5 per cent increased gasoline production are obtained. *These savings are in addition to any which can be secured by the use of low pressure heat exchangers.* The Leach High Pressure Vapor Heat Exchanger was the first to be developed for this service, and is the only design which has proven its durability in actual use. Over thirty-one units have now been in operation for periods up to two and one-half years without requiring major repairs.

A CORROSION-PROOF CONDENSER OR LOW-PRESSURE EXCHANGER

The cast iron shell unit is built for the most severe corrosive service. A base channel casting with condensate collection basins raises the lowest machine surface or flanged joint above condensate level. Shell and tubes are vertical and headers inclined to insure rapid drainage of condensate from all parts. If desired, the base casting, being but a small part of the shell, can be made of corrosion-resisting alloy without materially increasing the cost. Leach Low Pressure cast iron shell heat exchangers are successfully condensing naphtha so corrosive that standard wrought iron run down pipes are destroyed in forty-four hours.

STEEL SHELL LOW-PRESSURE VAPOR HEAT EXCHANGERS

This is a standard unit for all low-pressure use where extreme resistance to corrosion is not required. It embodies all the patented Leach features.

LOW PRESSURE DROP THROUGH LEACH VACUUM CONDENSERS

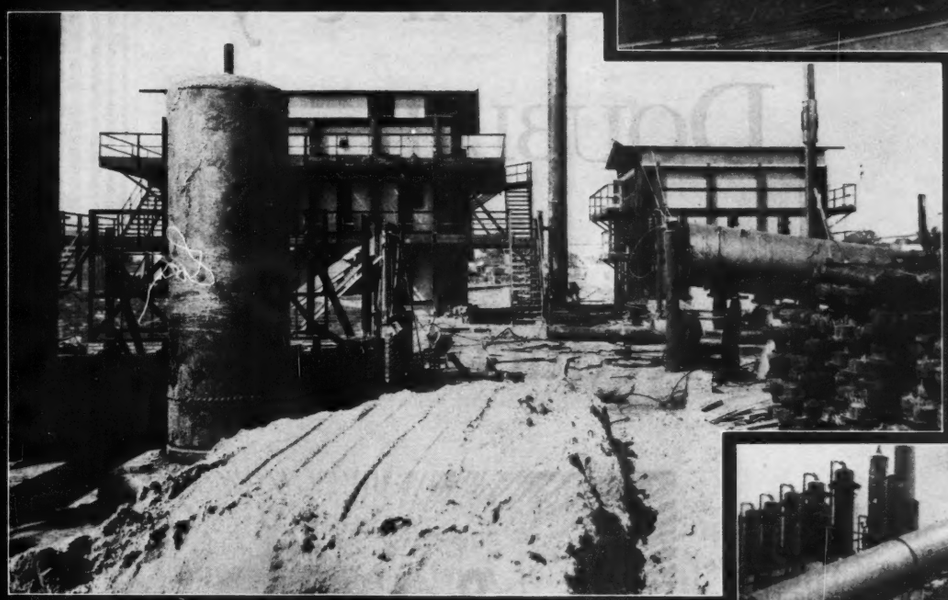
The Leach High Vacuum Oil Condenser is built to set directly upon the separator shell without intervening piping, eliminating pressure loss. By making use of the multiple tube bundles and condensate basins for condensing streams of different gravity, this exchanger may be used to regulate viscosity, separate cracked products, drop out discoloration, make small quantities of special high viscosity distillate, etc., without the intervention of a bubble tower.

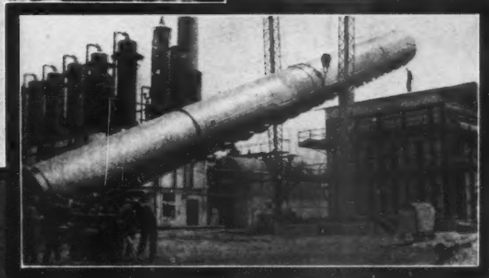
For further details write the

C. H. LEACH COMPANY

9-11 Park Place **New York, N. Y.**

ALWAYS ACTIVE!





WINKLER-KOCH'S unceasing activity in the development of scientific distillation and cracking units and their solutions of allied problems have placed them well in the fore-front of Progress in the refining art.

The WINKLER-KOCH ENGINEERING CO.

Consulting and Construction Engineers

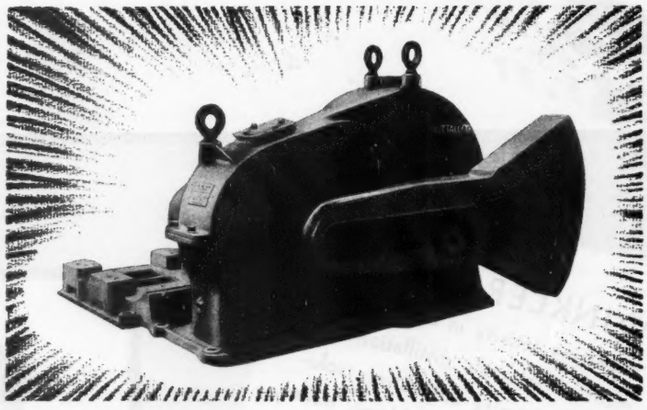
FIRST NATIONAL BANK BLDG.
WICHITA, KANSAS

CALIFORNIA OFFICE, 1205 PACIFIC NATIONAL BANK BUILDING, LOS ANGELES

Mechanical Efficiency DOUBLED ... with OP Reduction Gears

WITH Westinghouse-Nuttall double-reduction gear drives in place of countershafts and band-wheels, the overall mechanical efficiency of electric pumping equipment—motor to polish rod—is practically doubled, for these gear units have a remarkably high efficiency—96 to 98 percent.

The more efficient operation thus obtained results in a considerable decrease in power consumption of the motor, and consequently lowers the cost of production.



A Type OP-11 double-reduction gear unit, complete with balanced crank and motor bedplate, for 15-35 and 20-50-hp. two-speed oil well motors.

Hardened gears with teeth accurately ground to close limits, anti-friction roller bearings for all shafts, and constant lubrication of all moving parts by a positive splash system are principal reasons why such exceptionally smooth, power-saving operation is obtained in Westinghouse-Nuttall double-reduction gear drives.

Plenty of strength in every detail preserves the high efficiency of these units throughout many years of dependable, economical service.

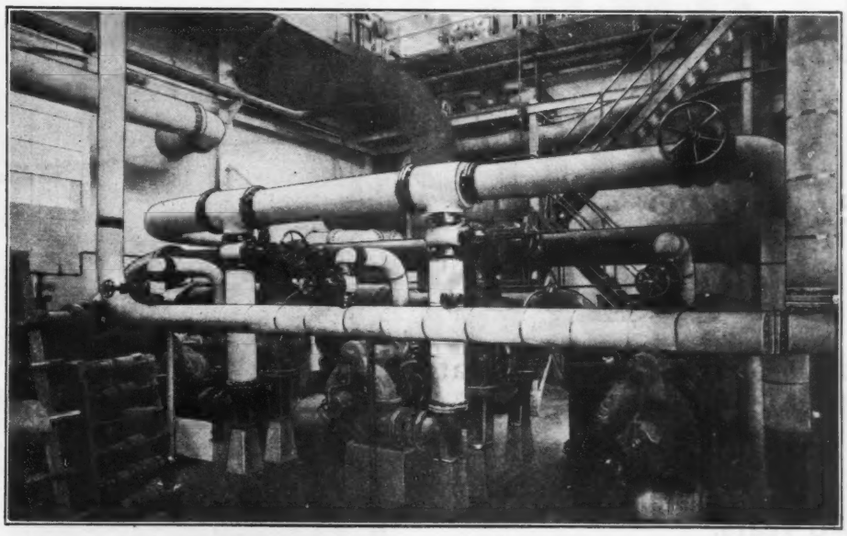
Address inquires to any branch of the Oil Well Supply Company, located in all oil fields.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

Westinghouse

T 30879-A

▲▲▲ if it is ATWOOD PIPING ▲▲▲



YOU can be certain that your piping system is *reliable*, easily *accessible*, that any *possibility of deterioration has been reduced to a minimum*, and that *the most advanced engineering knowledge has been used to insure the highest operating efficiency* for the service intended. In the installation partially illustrated above (one of the largest blast furnace and coke plants in the country) all these fundamental requirements are incorporated to the greatest degree possible.

Whatever Piping job you may have on hand . . . . a complete Piping System (designed, manufactured and installed), a Welded Header, a Coil, or only a Pipe Bend . . . we shall be pleased to submit an estimate, as well as give you all the help possible.

FOUNDERS SINCE 1825 • VALVES AND PIPING SINCE 1866 • Trade Mark ATWOOD

PITTSBURGH VALVE, FOUNDRY & CONSTRUCTION CO.
PITTSBURGH ~ PENNA.

DISTRICT OFFICES

New York City	30 Church Street
Chicago, Ill.	80 East Jackson Blvd.
Boston, Mass.	185 Devonshire Street
Cleveland, Ohio	858 Rockefeller Bldg.

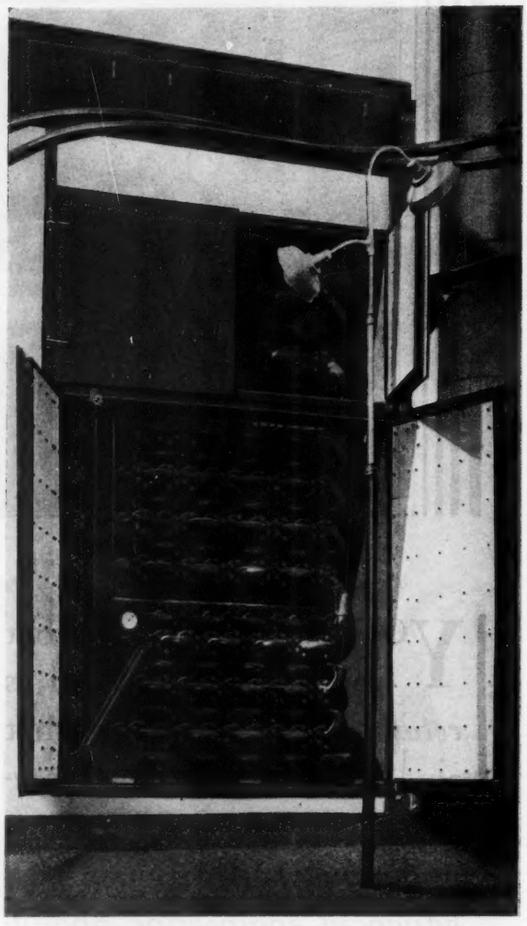
REPRESENTATIVES

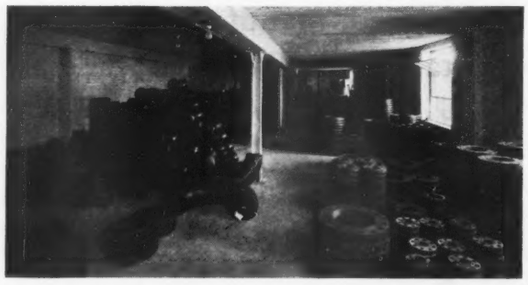
Detroit, Mich.	Garrett Burges, Inc., Woodbrook Bldg.
Houston, Texas	Maintenance Eng. Corp., 1400 Conti Street
Atlanta, Ga.	Moore-Broach Eng. Co., Forsyth Bldg.
Philadelphia, Penna.	R. J. Crozier Co., 10 South 18th Street
Los Angeles, Cal.	John G. Bell Co., 712 East Sixth Street

A TUBE-TURN INSTALLATION *with* TAYLOR *Butt Welding* - - - FLANGES

TEN stills of the type shown at the right, with Tube-Turn return bends and Taylor butt welding Flanges, have been in operation over two years.

Today's better engineering practice in and around the refinery demands Tube-Turns and Butt welding Flanges, giving simplicity and strength plus economy and efficiency for connections and turns of any degree, for all sizes of pipe. Write for complete details.





ADEQUATE STOCKS of TUBE-TURNS

TAYOR butt welding FLANGES and MASON REGULATORS.... carried at TULSA for immediate shipment to all oil field points.

THE MOORLANE Co.
[INCORPORATED]
TELEPHONE 9412
TULSA,.....OKLAHOMA

Why plug up your condensate drainage lines?

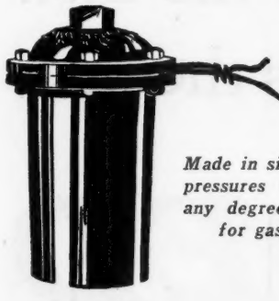
Armstrong Traps draining ammonia condenser and separator on steam main to condenser—Superior Oil Works, Warren, Pa.

A STEAM trap that doesn't pass air and incondensible gases automatically is more of a hindrance than a help. The drip line is practically plugged until the air is manually relieved from the trap.

Armstrong inverted bucket traps cannot airbind, nor do they clog up from floating grease or sediment. The upward swirling motion of the condensate makes them self-scrubbing. Other features that make the Armstrong practically attentionless: No steam leakage . . . no valve wire-drawing . . . small size and compactness (all working parts are inside). It is very common for them to operate efficiently without attention for years.

There are probably more Armstrongs in use in the oil industry than any other separating trap. If you are not yet acquainted with their performance we will gladly send you as many traps as desired for 90 days' test, without cost to you or obligation. At the end of the test, return the traps to us, collect. The coupon below is for your convenience.

Armstrong Machine Works
368 Maple Street,
Three Rivers, Michigan



Made in sizes and types for pressures to 1350 lbs. and any degree superheat; also for gasoline service.

Fill in and Mail For 90 Day Test

To _____ (Name) _____ (Firm)
_____ (Position) _____ (City) _____ (State)
_____ (Street)
For _____ (Size and make of machine)
Size of Pipe ..... Steam Pressure (Max.) .....
☐ *Send Catalog* *from*
ARMSTRONG MACHINE WORKS
368 Maple Street
THREE RIVERS, MICH.

OGJ 3-6 Gray

ONE SMITH ORDER

On October 9, 1928, the A. O. Smith Corporation received their first order from one refining company for 4 Fractionating Columns, 7′ I.D. x 69′ $2\frac{1}{8}$″ x $3\frac{1}{2}$″ wall.

Since then we have received orders for:

March 8, 1929

4 Collecting Chambers
21′ I. D. x **26**′ **3**″ x **1½**″ wall.

April 12, 1929

10 Separating Chambers
7′ I. D. x **28**′ x **3½**″ wall.

10 Fractionating Towers
7′ I. D. x **30**′ x **3½**″ wall.

October 29, 1929

8 Separating Towers
9′ I. D. x **30**′ x **1¾**″ wall.

8 Fractionating Towers
9′ I. D. x **33**′ x **1¾**″ wall.

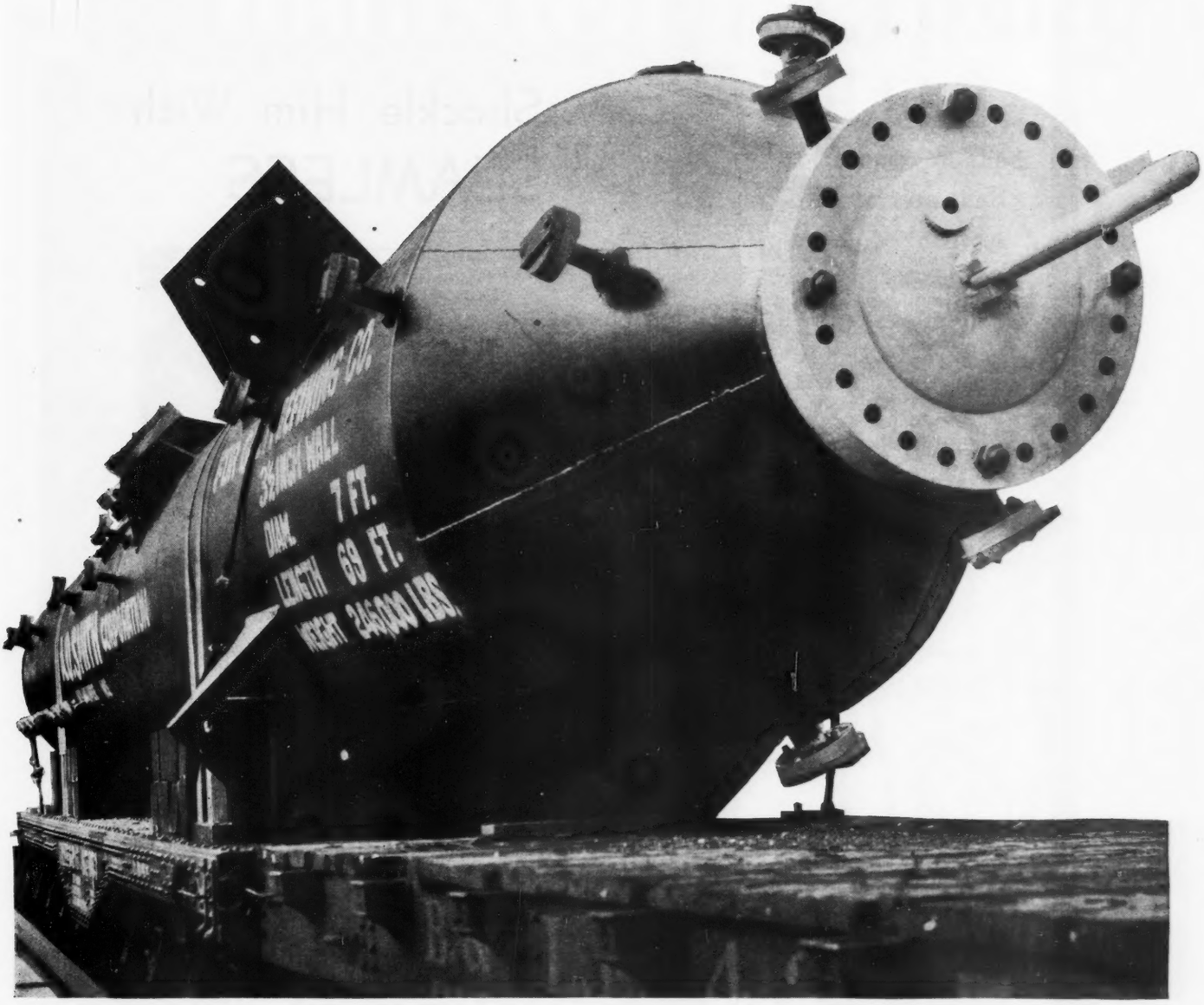
8 Receiving Drums
6′ I. D. x **16**′ x ¾″ wall.

8 Receiving Drums
6′ I. D. x **16**′ x **1**″ wall.

The second order in units equalled the first.
The third order in units was five times the first.
The fourth order in units was eight times the first.

SMITH*WELDED*

SELLS THE NEXT



A. O. SMITH CORPORATION

General Offices:

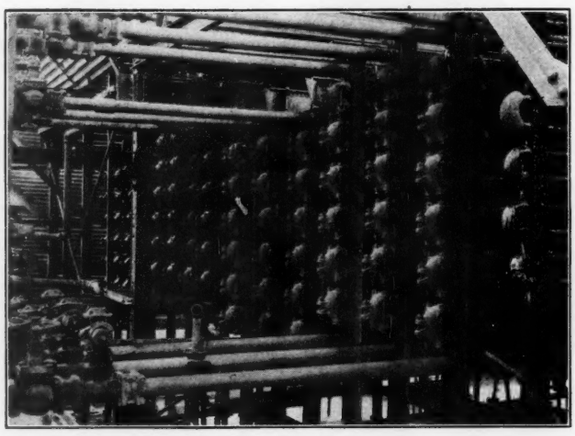
Milwaukee, Wisconsin

Oil and Gas Field Products Division

District Offices: New York · Tulsa · Houston · Los Angeles

CRACKING STILLS

. . . Shackle Him With SEAMLESS



PRESSURE . . . that destructive demon lurking in the pipes . . . meets his master in sturdy tubes of Pittsburgh Seamless.

The fine open-hearth steel from which all Pittsburgh Seamless is made; the flawless, dense-grained walls, free from seams, pits, pin holes or potential weakness, give Pittsburgh Seamless tubes the necessary extra strength that assures a surplus of resistance to pressure and reduces costs by obviating replacements.

Pittsburgh Steel Products Co.
Division of
Pittsburgh Steel Co.

Pittsburgh ▲ New York ▲ Detroit ▲ Chicago
St. Louis ▲ Tulsa ▲ Houston

Largest Manufacturers of Seamless Steel Pipe and Tubing Exclusively

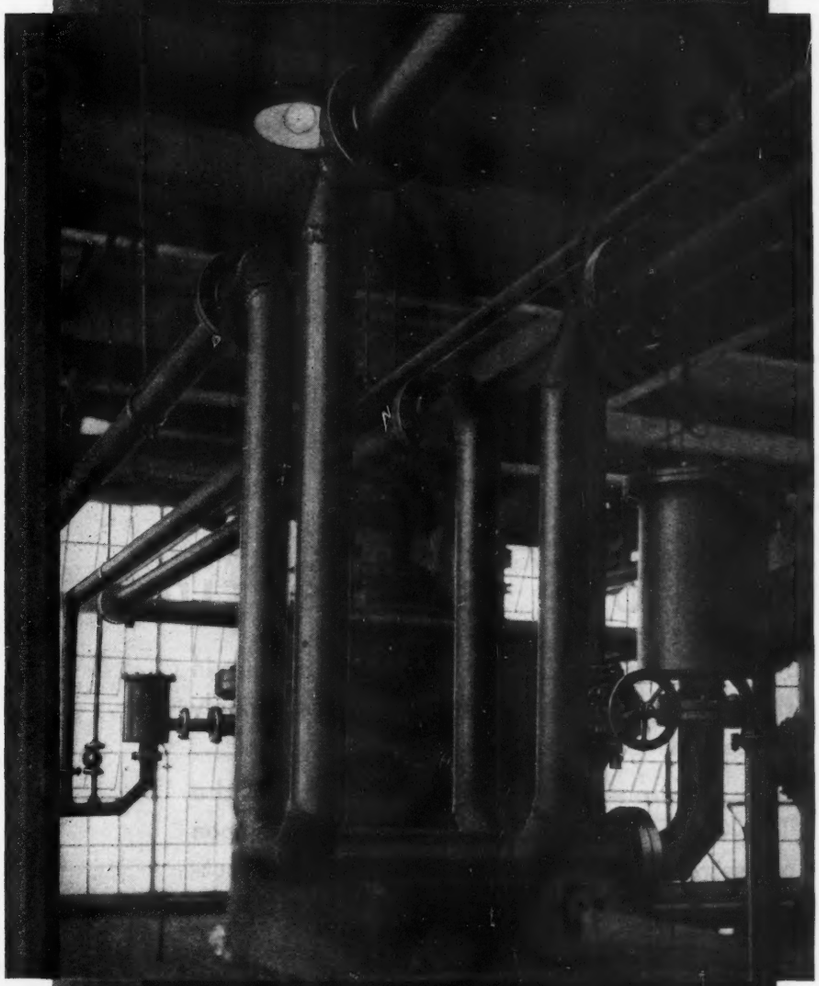
Pittsburgh Seamless

HIGH PRESSURE PIPING
Still Tubes Boiler Tubes Line Pipe

EXTRA STRENGTH EXTRA LENGTH

2924

WELDED Industrial Piping



"Proper methods of inspection and procedure control have been established and are available to all interested; so there is no longer any excuse for poor work. Welded lines are often cheaper in first cost, and are invariably superior in the matter of tightness."

—From an Editorial in **POWER**

As pioneers in procedure control welding, we supply industry with the best of everything for oxwelding and cutting.

LINDE OXYGEN
The Linde Air Products Co.

Oxweld
Apparatus and Supplies
Oxweld Acetylene Co.

Prest-O-Lite
Dissolved Acetylene
The Prest-O-Lite Co., Inc.

UNION CARBIDE
Union Carbide Sales Co.

Units of
UNION CARBIDE AND CARBON CORP.

General offices
30 East 42nd Street
New York, N. Y.

UCC

Sales offices in
Principal cities
throughout the country

65 Linde plants — 48 Prest-O-Lite plants — 174 Oxygen Warehouse stocks — 156 Acetylene Warehouse stocks — 42 Apparatus Warehouse stocks — 245 Carbide Warehouse stocks

IN BUSINESS the Majority Vote is Unerring

Majorities may make mistakes in politics; but in the business world the right product is unerringly elected to leadership.

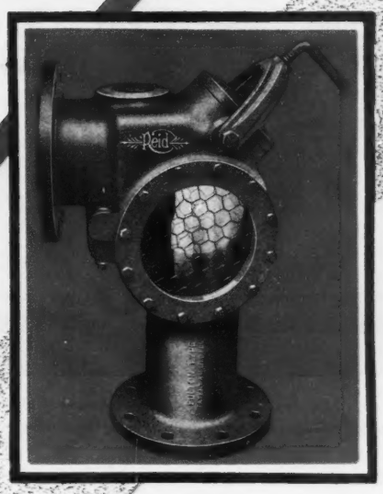
The preference among oil producers for the Tret-O-litE Process of treating cut oil is based upon a wise recognition of values. This process is outstanding in its rapidity, thoroughness, certainity and economy.

Major operators rely upon Tret-O-litE and the service of the Wm. S. Barnickel & Company organization to insure them against losses due to petroleum emulsion.

In every oil district are Tret-O-litE representatives ready to bring to your lease, at your request, the facilities and accumulated experience of the Wm. S. Barnickel & Co. organization.

WM. S. BARNICKEL & COMPANY
ST. LOUIS, MO.
Offices and Plant, Webster Groves, St. Louis County, Missouri

Tret-O-litE
Reg. U. S. Pat. Off.



for Modern Refineries

THE FULTON TYPE RECEIVING BOX

The Fulton Type Look Box is narrow and compact of design. The look windows, fitted with polished wire-inserted plate glass, are set at an angle affording a clear view of the interior. Special windows of Pyrex heat-resistant glass can be furnished for installations where the oil is hot.

One feature, particularly desirable, is the oil pocket from which samples of oil passing through the box may be taken without opening the box.

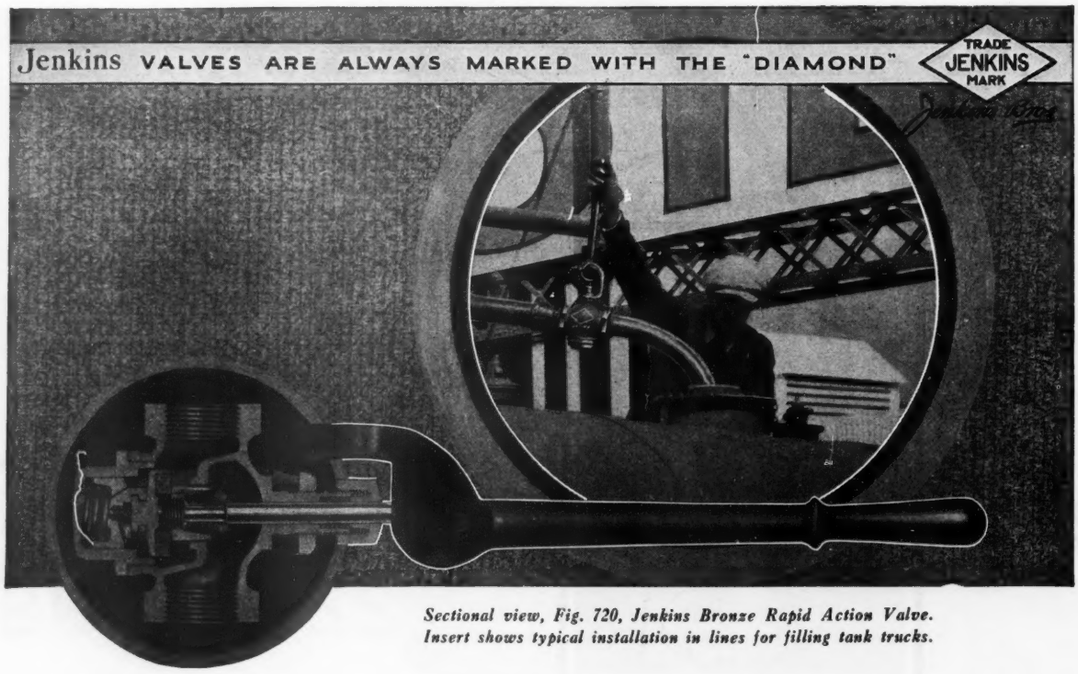
These boxes can be furnished with flanges for two, three, four, and six-inch pipe. In addition a special six-inch box having a 12-inch wide weir can be furnished for installation handling heavy streams.

For a complete description of this box, and other refinery equipment, write for descriptive Bulletins No. 38.

JOSEPH REID GAS ENGINE COMPANY
OIL CITY, PENNSYLVANIA, U. S. A.

BRANCHES: Marietta, Newark, and Logan, Ohio; Charleston, W. Va.; S. R. Shoup, 724 Board of Trade Building, Los Angeles, California. DISTRIBUTORS: Frick-Reid Supply Corp., Pittsburgh, Pa., and Tulsa, Oklahoma, Distributors for Bradford and Pittsburgh, Pa., Mt. Pleasant and Muskegon, Mich., Kentucky, Oklahoma, Kansas, Texas, Arkansas, Louisiana and Wyoming; R. B. Moore, Bolivar, N. Y.; distributed in California by The Republic Supply Co. of California, Los Angeles, Calif.

Export Sales Representatives:
OILFIELD EQUIPMENT CO., Inc.
30 Church St., New York City



Sectional view, Fig. 720, Jenkins Bronze Rapid Action Valve. Insert shows typical installation in lines for filling tank trucks.

Speed up tank filling

Lift the lever of this Jenkins Bronze Rapid Action Valve, and instantly a flow is released into the tank truck. Tap down the lever, and the flow is shut-off to the last drop.

This Jenkins is a business-like valve. As its name implies, it is always ready for quick use. A renewable disc of oil-resisting composition, with which this valve is fitted when ordered for petroleum services, provides leak-proof contact at the valve seat.

Folder 70a contains further details on Jenkins Rapid Action Valves. Gladly sent on request.

JENKINS BROS.

80 White Street, New York, N.Y. 133 No. Seventh Street, Philadelphia, Pa.
524 Atlantic Avenue, Boston, Mass. 646 Washington Boulevard, Chicago, Ill.
JENKINS BROS., Limited, Montreal, Canada; London, England
Factories: Bridgeport, Conn., Elizabeth, N.J.; Montreal, Canada

Jenkins
VALVES
Since 1864

Modern Woodworking Shop, where Halliburton Plugs are made.

In the Halliburton process there are no "minor matters." The smallest piece of equipment, the tiniest detail of procedure is constantly being subjected to the searching inquiry of research and experiment. . . Cementing plugs, for example, seem simple enough—yet even their design and construction are the result, not of chance, but of exhaustive study and test. . . Halliburton is a scientific organization, rendering a scientific service to the industry.

HALLIBURTON
OIL WELL CEMENTING CO.
Duncan, Oklahoma

THE CEMENTER—containing news of the industry, information on cementing developments and a dash of humor—will be mailed to you regularly as issued if you will fill in and mail the coupon.

Halliburton Oil Well Cementing Co.
Dept. OG, Duncan, Oklahoma.

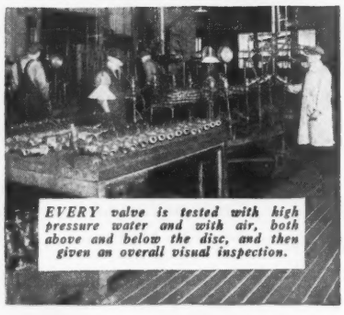
Without cost or obligation, please place my name on the list to receive THE CEMENTER regularly as issued.

Name _____

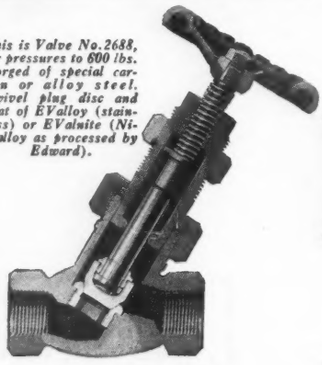
Company _____

Address _____

Drilling and tapping body ends of forged steel valves. Clean, accurate threads of full depth, perfectly aligned, save time for the pipe fitter.



EVERY valve is tested with high pressure water and with air, both above and below the disc, and then given an overall visual inspection.



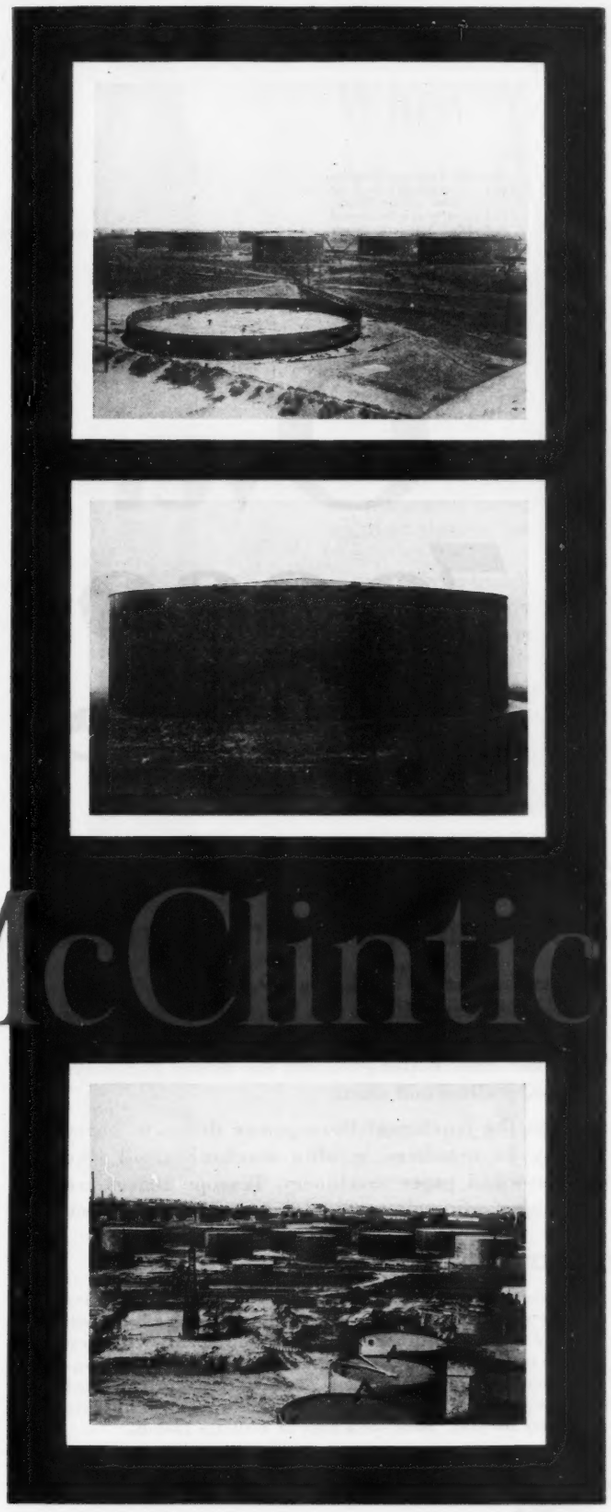
This is Valve No. 2688, for pressures to 600 lbs. Forged of special carbon or alloy steel. Swivel plug disc and seat of EValloy (stainless) or EValnite (Nitralloy as processed by Edward).

MODERN PRODUCTION
UNVARYING PRECISION

Modern production methods assure unvarying precision. What do you need in high pressure valves? Answer: Strength, stamina to resist gruelling service through wide temperature ranges, and low lifetime cost. Exact control — from test of raw materials — through all stages of production to final inspection — each operation based on carefully determined standards — holds every Edward valve to the same high level of quality, at surprisingly low cost.

THE EDWARD VALVE & MANUFACTURING COMPANY
EAST CHICAGO INDIANA

EDWARD VALVES



McClintic-Marshall STEEL TANKS

From blueprint to finished tank—that is the wide scope of McClintic Marshall steel tank service.

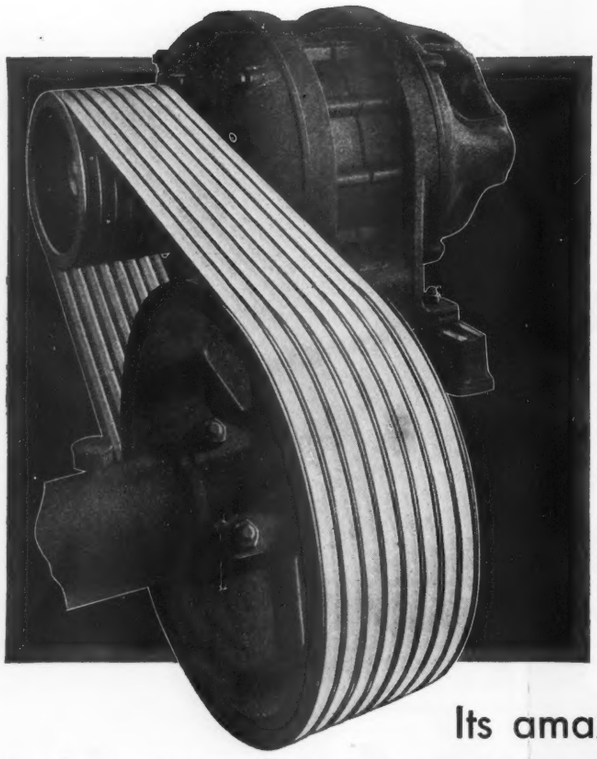
Built by a great organization with worldwide service facilities—backed by the largest steel fabrication plant in the United States, McClintic Marshall is in the unexcelled position to offer you the advantages of undivided responsibility and the money-saving advantages of their modern production facilities.

McCLINTIC-MARSHALL COMPANY
PITTSBURGH

BRANCH OFFICES

New York	Chicago	Detroit	Pottstown
Philadelphia	Cleveland	Cincinnati	Los Angeles
Boston	Baltimore	San Francisco	Charlotte
St. Louis		Buffalo	

Address Communications to Nearest Office



Texrope Belts and Sheaves are carried in stock at points from which the entire country can be served promptly. Standard drives from 2 to 100 H. P. are thus available. Quick delivery can be made on larger drives.

Over 70,000 in service

Its amazingly rapid acceptance is the most Convincing Recommendation for Texrope

APPROXIMATELY four years ago Texrope Drive was announced to industry.

Today over 70,000 Texrope Drives are in service . . . giving more satisfactory performance than any other method of transmission . . . In every industry the trend is definitely toward Texrope.

In plants where flat belts last only a few weeks, Texropes are giving continuous service. Replacements are infrequent and inexpensive.

Where moisture or dirt is unavoidable, Texrope Drives operate with no loss in efficiency. Requiring no lubrication, the maintenance cost on Texropes is practically nothing . . and the drive is always clean, positive and silent.

From the fractional horsepower drives to heavy duty on crushers, mining machinery, oil line pumps and paper machinery, Texrope Drives are giving continuous service at amazingly low cost.

See How Texrope Solves Transmission Problems

Texrope Drive consists of a driving and a driven sheave, grooved for V-shaped endless Texrope belts of rubberized cord fabric. Power is transmitted, with no slippage, by the wedging contact of the belts in the V-shaped grooves. The result is a short center drive with an efficiency of 98.9 per-cent, requiring practically no maintenance and infrequent adjustment.

Continuous operation is assured. One or two belts may wear out after long service, but the remaining belts will carry the load until replacement is convenient. With Texrope it is possible to use a higher speed motor, with a consequent saving in cost . . . Texrope is rightly termed "The Perfect Transmission for Every Purpose". It will save money for you. Send for a copy of Bulletin 1228-K.

ALLIS-CHALMERS MANUFACTURING CO., (*Texrope Division*) Milwaukee, Wis.

Builders of Power Machinery Since 1846

ALLIS-CHALMERS

TEXROPE DRIVES

THE PERFECT TRANSMISSION — ALLIS CHALMERS TEXROPE DRIVE — FOR EVERY PURPOSE

When You're Talking About Core Barrels— BAKER is a Mighty Good "Buy" Word

Operators all over the world are using the Baker Cable Tool Core Barrel — Russia, Australia, Mexico, far-away Papua — because they have found that it gives unusual service and is built so strong in every particular that it will "stand the gaff".

These operators know, from experience, that they can depend upon the Baker Cable Tool Core Barrel to bring to the surface a maximum percentage of perfect, uncontaminated core, no matter what the type of formation in which they are drilling.

There are two kinds of very important information which make coring necessary: 1. The lithological character of a formation can be ascertained more readily and more accurately than in any other way. 2. Many characteristics of formations and minor structural features are utterly lost in cuttings, but revealed perfectly in an uncontaminated core.

The Baker Cable Tool Core Barrel is noted for its efficiency and economy of operation, and for its effectiveness in coring in any type of formation.

We have prepared a 16-page treatise on the Baker Cable Tool Core Barrel which is interesting, informative, and valuable. It is yours for the asking.

Sample of cores taken with Baker Cable Tool Core Barrel in medium to fairly hard formations.

Your Guess May Be Good—But Coring Means Positive Knowledge of Formations

Mid-Continent Branches
Tulsa, Oklahoma Houston, Texas
Export Sales Office
25 Broadway, New York City

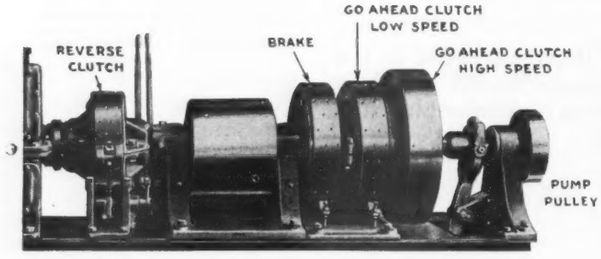
BAKER
OIL TOOLS, INC.
P. O. Box L, Huntington Park, Calif.
California Branches
Coalinga, Ventura, Taft, Bakersfield

Mid-Continent Distributors
B. & A. SPECIALTY CO.
220 E. Brady St., Tulsa, Okla.
2301 Commerce St., Houston, Tex.

Baker Standard Core Barrel is Universally Accepted as the Standard of Coring Performance

Stocks carried by Dealers in all active Mid-Continent fields.

Consider the LONG LIFE of the Clark Drilling Engine



CLARK Type "G" 2-Speed CLUTCH

Roller Bearings on low-speed gears . . . removable liners in reverse drum and pedestal bearings . . . outside clutch and brake bands, which radiate heat directly and are instantly accessible . . . correct lubrication throughout . . . all belt strains removed from engine crankshaft . . . are features in CLARK Type "G" service supremacy.

Above is shown a Clark Drilling Engine approximately 10 years old, recently converted to operate a belt-driven compressor in a Sinclair gasoline plant at Carr City, Oklahoma.

The CLARK Drilling Engine is a ruggedly constructed, SLOW SPEED machine, with safety speed limit governor and reliable automatic lubrication.

Many operators tell us that they drill well after well with this engine, with very little upkeep expense.

CLARK BROS. COMPANY
OLEAN, NEW YORK

Export Office: 150 Broadway, New York City
Mid-Continent Sales Offices: Tulsa and Fort Worth
California: Smith, Booth, Usher Co., 228 S. Central Ave., Los Angeles. Warehouses: Tulsa, Oklahoma; McCamey and Sweetwater, Texas; Artesia, New Mexico

Compressors and Gas Engines

CLARK

YOU CAN'T SUGAR-COAT LOST PROFITS

FOR many years the insatiable call for oil — and more oil — kept operators on the jump, day and night, to supply the demand. Line pipe was dumped into the ground unprotected. Any measures were justified that would speed up laying the lines and pipe the liquid gold to the sales terminals and cash in. But no more. Competition, as well as good business practice, demands protection of the pipe lines themselves in order to protect the investors. Profits decimated by huge costs of digging up, reconditioning and relaying pipe lines, are gone forever and no amount of sugar will sweeten disappointed stockholders.

For twenty-three years this organization has been developing a group of protective coatings that would meet the rigid requirements of owners and operators of pipe lines. Biturine Coatings have established a dead-line for corrosion and its destructive allies. Pipe coated with Biturine is proof against corrosion, acids, alkalis. Biturine protected pipe is being laid in ever-increasing mileage every year and is enthusiastically endorsed by operators and their engineering experts. Biturine has met the stiffest tests in competition and proved its superiority beyond question. Thousands and thousands of miles of Biturine Coated pipes are giving their owners worry-proof service and turning reconditioning "write-offs" into dividends.

Records of Biturine Coated lines will be furnished to those interested in application to any of the offices listed below.

GENERAL PAINT CORPORATION
HILL, HUBBELL & COMPANY DIVISION
PAINTS — VARNISHES — LACQUERS
Specialists in the science of protective coatings for industry
Chicago New York Tulsa Houston Dallas San Francisco
Oakland Los Angeles Portland Seattle Spokane
Export Offices: 11 Broadway, New York, N. Y., U. S. A.
160 Fremont Street, San Francisco, Calif., U. S. A.

PROTECT YOUR PIPE LINE INVESTMENT *AT THE TIME YOU ORDER YOUR PIPE.* YOU CAN DO IT NOW BY SPECIFYING THE HILL, HUBBELL & COMPANY PROCESS OF MACHINE COATING AND WRAPPING NOW AVAILABLE FOR THE PRODUCTION OF SIX LEADING PIPE MILLS. WRITE FOR FULL INFORMATION.

BITURINE COATINGS
Biturine Enamel
*Biturine Enamel Primer
Biturine Coupling Solution
Biturine Solution No. 5
Biturine 70-30
**Biturine Enamel Primer can*

INHIBURINE

This new inhibitor with extraordinary anti-corrosive powers is now being incorporated into Biturine Primer whenever specified. Being solvent in bitumens it becomes an integral part of the priming and functions as a second line of defense against corrosion should the Biturine Coating be penetrated.

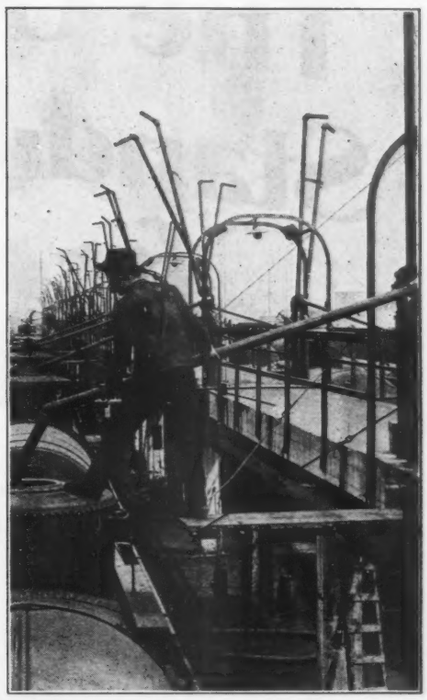
NATIONAL TUBE COMPANY
Subsidiary of United States Steel Corporation
PITTSBURGH, PA.

Special Paint Primers

for the oil industry

... *from* DU PONT

They are anti-corrosive and rust-inhibitive ... neutral in color, easy to hide ... set up and dry quickly ... have excellent adhesion and furnish a suitable bonding surface for finishing coats.



—Photo by Ewing Galloway.

On loading platforms where rough wear and plenty of dirt are met, du Pont special primers will carry the burden and support the finishing coat.

CORROSION attacks your steelwork . . rust destroys your tankage — unless a good primer provides a tough base to support all your paint systems.

But how can you choose the correct primer?

Just see if it has these qualities, that du Pont chemists have built into du Pont's special primers for the oil industry:

1. It must be anti-corrosive and rust-inhibitive.
2. It must be suitable for brush or spray application, flowing smoothly and spreading easily.
3. It must have perfect adhesion to the surface, lying close to the metal in a continuity of film, as well as furnish a good bonding surface for finishing coats.
4. It must be neutral in color, easy to hide with its finishing coat.
5. It must set up in 4 to 6 hours, drying ready for finishing coats in 18 to 24 hours.
6. It must keep well in the package, not settling unduly hard.
7. It must maintain the proper ratio of pigment to vehicle, and of volatile to non-volatile.

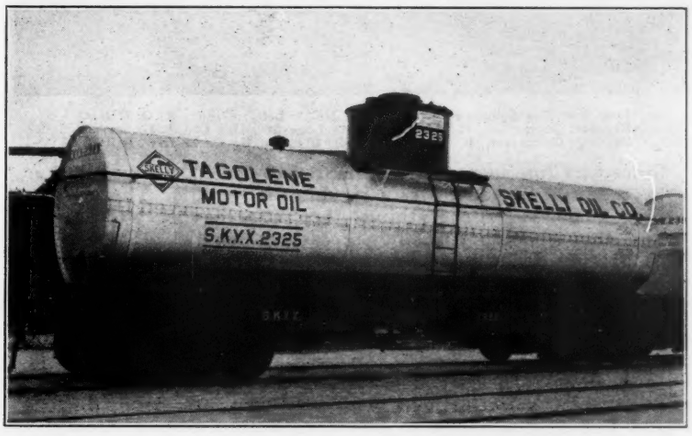
Considering these factors, du Pont chemical engineers—assisted by engineers of the petroleum industry—have formulated five primers to meet the oil industry's strenuous requirements.

No. 45 Primer Is Best Anti-Corrosive

The pigment portion of *No. 45 Kromate Metal Primer* is made up of the best rust-inhibitive combination known at the present time. The vehicle portion is formulated to give maximum life to any system.

This primer dries to a hard, dull film that lies close to the surface . . . a film that gives best adhesion to further undercoats or finishing coats. It sets up dust free in 3 to 5 hours, drying hard in 18 to 24 hours—fast enough to avoid harm from moisture condensation and early dews. Spreading capacity ranges from 500 to 700 square feet per gallon brushed . . . it is furnished ready for use . . . has no unusual settling . . . is easily reincorporated . . . works freely under the brush.

No. 45 Kromate Metal Primer is particularly adapted to surfaces where the finished system will have contact with water.



Du Pont primers protect the metal of this tank car and furnish an ideal bonding surface for the finishing coat.

No. 44 Primer for Aluminum Paint Systems

A longer oil product, *No. 44 Aluminum Paint Primer* has a pigment portion made up of basic lead chromate and sublimed blue lead. While it is designed specially to receive a finishing coat or coats of aluminum paint, it is also suitable for any oil finish coats.

Because it has a neutral plum color it will not show laps or breaks in the finishing coat—a valuable advantage. It has the other worthwhile qualities of No. 45 Primer.

No. 7 Primer Handles Easily

Developed somewhat along the same lines as the No. 45 Primer, this *No. 7 Metal Primer* has a pigment portion of basic lead chromate and iron oxide.

It is lower in price, but it should not be confused with a low priced iron oxide primer. It serves a well-defined demand where normal preservative qualities are needed.

No. 76 Primer Made of Red Lead

The rust-inhibitive value of red lead has been known for many years, it being among the first in general use, but it has now been largely displaced by basic lead chromate, sublimed blue lead and others.

This red lead primer is a long oil, free flowing product, the pigment portion of which is made up of 60% red lead and 40% asbestine. It represents the highest type red lead primer, judging from durability and ease of application. We do not, however, recommend it as an alternate for the No. 45 and No. 44 primers.

No. 41 Primer for Dark Finish Coats

For the many cases where a black metal primer is all right for color, we recommend *No. 41 Black Metal Primer*—a product with magnetic black oxide pigment reinforced with basic lead chromate and sublimed blue lead.

This pigment renders the film highly resistant to electrolytic action and is especially adapted to priming tank cars where the finishing coats are high gloss blacks.

As briefly shown above, each of these primers has its own special use. More comprehensive and more interesting facts than could be squeezed into this page, are available in Technical Bulletin No. 1, "Primers for the Petroleum Industry". Write for your copy to E. I. du Pont de Nemours & Co., Inc., Petroleum Sales Dept., Independence Square, Philadelphia; 2100 Elston Ave., Chicago; 351 California St., San Francisco.

Other du Pont Products for the Petroleum Industry

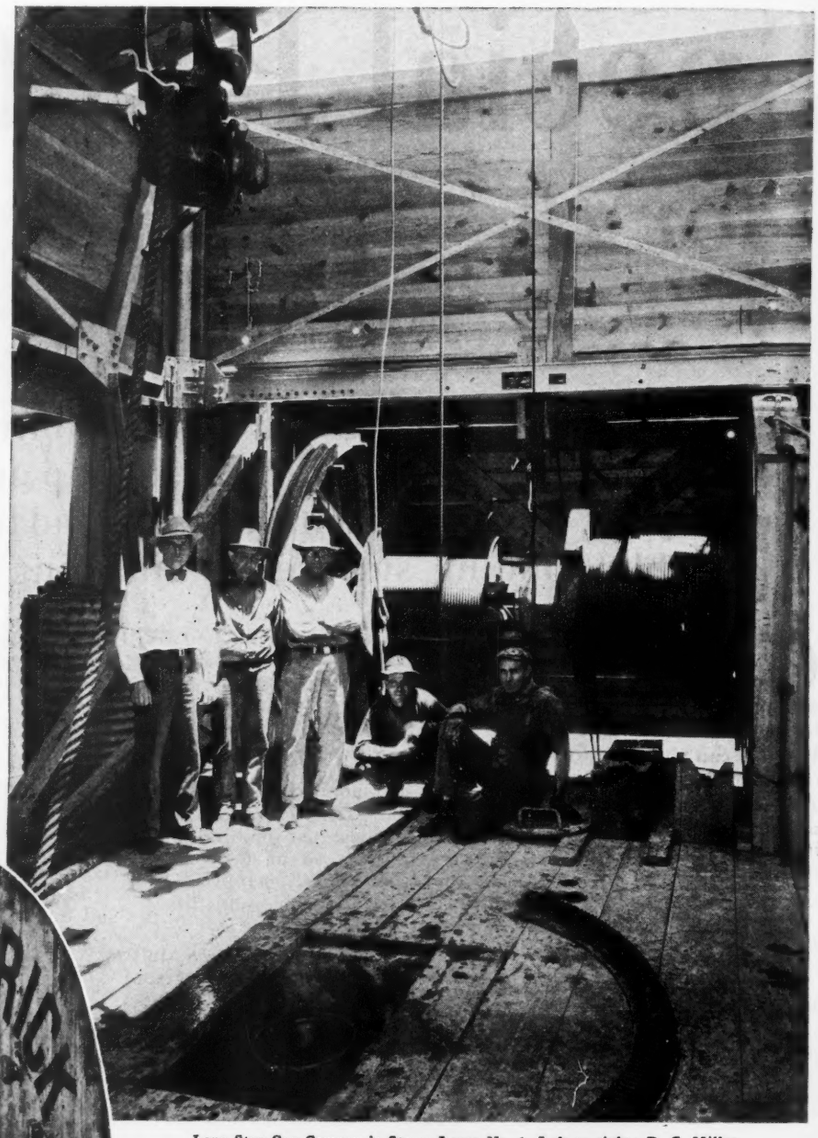
PETRO PAINT, a general purpose paint with many specific uses in the oil industry.
ASPHALT CHROMATE EMULSION, anti-corrosive for pipelines.
ALUMINUM PAINT VEHICLES
TANK CAR FINISHES
ANTOXIDE and other metal, structural and storage paints.

"Save the surface and you save all"—Paint Brand

DU PONT

REG. U.S. PAT. OFF.

The Old Stand-by *for* Cable Tool Drilling



Lone Star Gas Company's Storm Lease No. 1. Left to right: R. G. Miller, Republic Supply Co., H. C. Kelly, Supt., Lone Star Gas Co., J. L. Sarver, Drilling Contractor, G. C. Rowe, Tool Dresser, U. C. Morris, Driller.

Since wire line succeeded manila, B & B Steel Drilling Lines have been prime favorites for cable tool outfits. The crew says: "They've got everything—they're springy, they're flexible, they spool pretty, they're easy to handle." The cost accounting department sees another great virtue—the lines *last*. Why shouldn't they?

All wire is drawn to our own specifications and tested four ways before being laid up into rope on machinery designed for our exclusive use. Different fields require different lines. We make them all. Patentsteel, Extra Strong Cast Steel and Cast Steel Cable Tool Drilling Lines, Sand Lines and Pumping Lines; also powerful Yellow Strand Rotary Drilling Lines. Distributors in all fields.

Ask for Catalog K-2

BRODERICK & BASCOM ROPE CO., St. Louis

Factories: St. Louis and Seattle

Warehouses: New York, Portland, Ore., and Houston, Tex.

BRODERICK & BASCOM DRILLING LINES

N 837

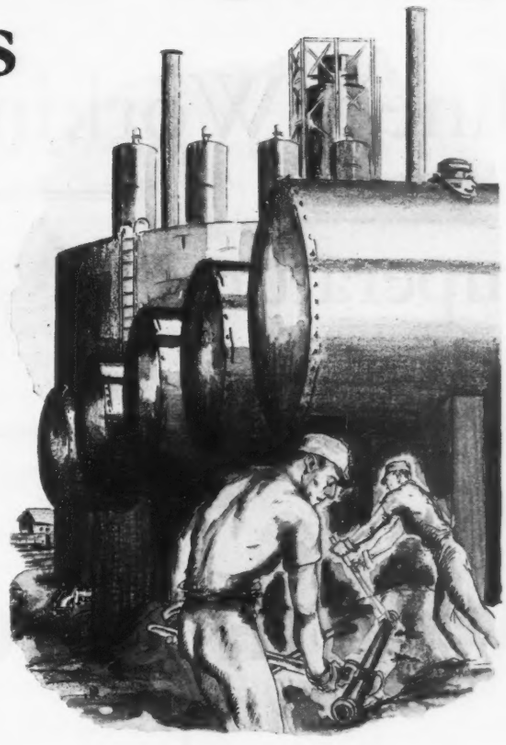
ARMCO INGOT IRON

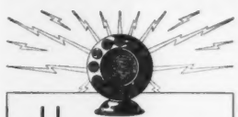
reduces metal upkeep in refineries

YOU need not keep on paying heavy toll to metal depreciation. Much of your sheet and plate equipment can *economically* and *profitably* be made of rust-resisting Armco INGOT IRON.

Here is the metal proved by twenty-three years of exacting performance. It has the longest record of *actual service* of any low-cost, rust-resisting sheets and plates.

If you contemplate new refinery equipment, or repairs to the old, call in an Armco Development Engineer. He'll have some helpful suggestions for you. Ask the office nearest you for this service.





Hear the famous
ARMCO CONCERT BAND
every Tuesday night
WLW-700K.-Cincinnati
Ten to eleven E.S.T.

Back of this familiar symbol is nearly thirty years' experience in the manufacture of special analysis iron and steel sheets and plates. When you want a rust-resisting, low-cost metal be sure to see this triangle and the words, "Armco INGOT IRON." It is your assurance of dependable, economical service.

ARMCO

THE AMERICAN ROLLING MILL CO.
Executive Offices, Middletown, Ohio
Export: The ARMCO International Corporation

DISTRICT OFFICES: Chicago, Cincinnati, Cleveland, Detroit, New York, Philadelphia, Houston, Pittsburgh, St. Louis, San Francisco, Tulsa

"BE SURE IT'S MADE OF ARMCO INGOT IRON"

. . . for

EVERY

Range of

Refinery Working

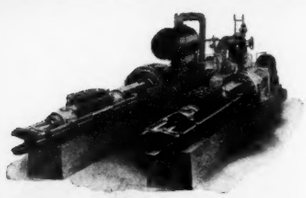
Temperatures

. . . there's a

WORTHINGTON

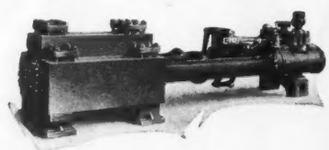
Pump

1000° F.



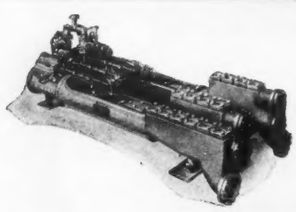
Worthington Horizontal Cross-compound Crank-and-flywheel Pumping Engine for 1000° oil

800°

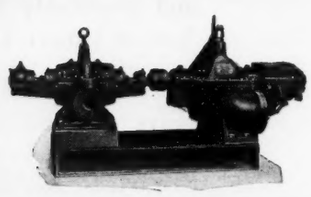


Worthington Horizontal Duplex Piston Pump for 800° oil

500°

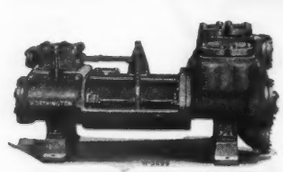


Worthington Horizontal Duoplex Piston Pump for 500° oil

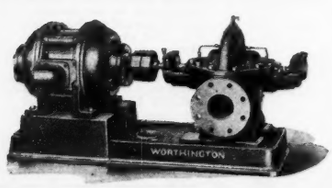


Worthington Horizontal Steam-turbine-driven Centrifugal Pump for 500° oil

80°



Worthington Horizontal Duplex Piston Pump for cold oil



Worthington Horizontal Ball Bearing Centrifugal Pump for cold oil

WORTHINGTON PRODUCTS

PUMPS
COMPRESSORS
Stationary and Portable
CONDENSERS
and Auxiliaries
DIESEL ENGINES
GAS ENGINES
FEEDWATER HEATERS
WATER, OIL and
GASOLINE METERS

Literature on Request

FEW, if any, divisions of industry employ more varied types of pumping equipment than does the refining of crude oil. Yet the refiner finds in the Worthington line the type of pump to take care of each of his requirements.

In the lower temperature ranges, Worthington offers both centrifugal and reciprocating types. For service above 500° F., there are the various types of reciprocating equipment . . . steam-driven pumps, power-driven pumps, surge pumps, crank-and-flywheel pumps . . . employing the time-proven Worthington forged steel and cast steel pump cylinders, to insure absolute safety at all temperatures and pressures.

The development of Worthington refinery pumps has progressed hand-in-hand with and, in many cases, has anticipated the growth of the petroleum industry. The experimental stage was passed years ago and today the equipment bearing the Worthington name has to its credit performance records covering long periods of successful operation.

At strategic points, in and near the refining centers, Worthington maintains district offices manned by engineers of long experience in refinery pumping.

The services of these men are at your command in the study of your problems . . . and a point worth considering is the fact that their recommendations are not biased by any limitation in type of equipment or of manufacturing facilities.

Telephone or write to the nearest Worthington office

WORTHINGTON PUMP AND MACHINERY CORPORATION
Works: Harrison, N. J. Cincinnati, Ohio Buffalo, N. Y. Holyoke, Mass.
Executive Offices: 2 Park Avenue, New York, N. Y.
GENERAL OFFICES: HARRISON, N. J.

District Sales Offices:

ATLANTA	CHICAGO	DALLAS	EL PASO	LOS ANGELES	PHILADELPHIA	ST. PAUL	SEATTLE
BOSTON	CINCINNATI	DENVER	HOUSTON	NEW ORLEANS	PITTSBURGH	SALT LAKE CITY	TULSA
BUFFALO	CLEVELAND	DETROIT	KANSAS CITY	NEW YORK	ST. LOUIS	SAN FRANCISCO	WASHINGTON

Branch Offices or Representatives in Principal Cities of all Foreign Countries

P-82

WORTHINGTON

THE OLD TIMER SAYS . . .

O. I. C. Standard Gate Valve for 125 pounds steam working pressure.

"I've used a lot of VALVES in my time but OIC's beat them all"

HUNDREDS of oil men support the "Old Timer" in making that statement . . . experienced plant superintendents . . . maintenance engineers who know valves and who choose O. I. C.'s for what they will do *on the job.*

Such men demand valves that stand up . . . valves that deliver continuous service with the least amount of attention. They refuse to risk any other kind. Shutdowns are too expensive—repair facilities usually too far away. In O. I. C.'s they find the strength . . . the high quality of materials . . . and the precision workmanship that completely fulfills their requirements.

Take the O. I. C. Standard Gate Valve pictured at the left. Note how strongly it is built. There's extra metal—extra re-inforcement at every point where unusual stresses and strains are likely to occur. To prevent undue wear, the wedge is designed so that it comes into contact with the seat only at the point of closing. A special split ring molded packing perfectly fits stuffing box and spindle. As very little compression is necessary, long life for the packing, and reduced wear on the spindle, are assured.

In every detail, O. I. C. Valves are specifically engineered to the requirements of the oil fields. They hold tight under severe operating conditions. They give years of trouble-free service. Their maintenance cost is extremely low.

On your next order, specify "O. I. C.'s". One trial will convince you that "no other valve is quite so good."

THE OHIO INJECTOR COMPANY, *Wadsworth, Ohio*

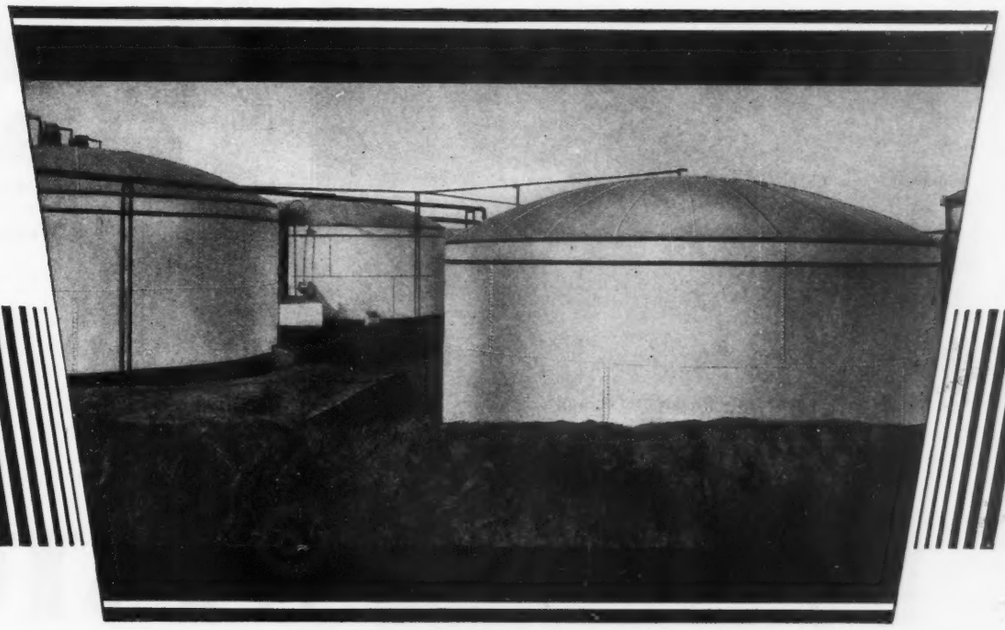
MAKERS OF DEPENDABLE VALVES AND INJECTORS AND SPECIALTIES FOR STEAM, OIL, WATER AND GAS SERVICE.

O. I. C. Valves are carried in stock and distributed by all leading supply stores in the oil country.

Good Valves *made by the* OIC folks *at* Wadsworth, Ohio

OIC

THIS COAT OF METAL PROTECTION



Prevents Corrosion—Defies Even the Attack of Hydrogen Sulphide Fumes

All paints have two major components—pigment and vehicle. Good paint jobs depend upon the proper selection of both.

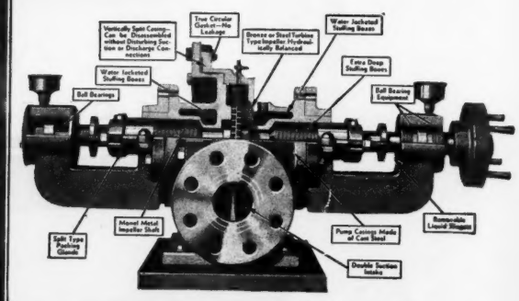
The pigment of aluminum paint is actually metal—minute flat flakes of pure Alcoa Aluminum. And aluminum is one metal that serves best in the oil field. It *cannot* rust, it resists corrosion, and the attacks of hydrogen sulphide gas leave it unscathed.

This paint brings a new kind of protection—a coat of metal protection—for oil tanks and other exposed metal structures. When it is applied, aluminum paint "leafs". The minute flakes of Alcoa Aluminum build up in layers, forming a tough, long-lasting protective paint coat.

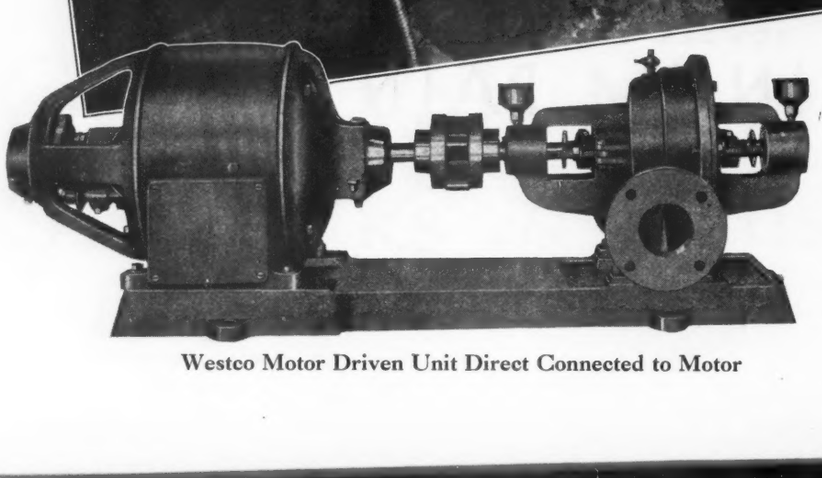
In time, any paint film will need renewing. But aluminum paint, made with Alcoa Albron Powder, out-wears, out-lasts ordinary paints. It costs no more than other kinds of good paint.

May we send you a free copy of "Aluminum Paint, the Coat of Metal Protection"? It fully describes the many protective uses of aluminum paint. ALUMINUM COMPANY *of* AMERICA; 2417 Oliver Building, PITTSBURGH, PENNSYLVANIA. Offices in 19 Principal American Cities.

ALCOA ALBRON
POWDER FOR
ALUMINUM PAINT


Vertically Split Casing Can be Disassembled without Disturbing Suction or Discharge Connections
True Circular Gasket—No Leakage
Bronze or Steel Turbine Type Impeller Hydraulically Balanced
Water Jacketed Stuffing Boxes
Extra Deep Stuffing Boxes
Water Jacketed Stuffing Boxes
Ball Bearings
Ball Bearing Equipment
Monel Metal Impeller Shaft
Renewable Liquid Slingers
Pump Casings Made of Cast Steel
Double Suction Intake

Sectional View
of
Westco Hot Oil Pump



Westco Motor Driven Unit Direct Connected to Motor

WESTCO *TURBINE* PUMPS

for Refineries, Pipe Lines and Natural Gasoline Plants

WESTCO TURBINE PUMPS are performing magnificently on scores of duties in the oil industry. Scarcely a month passes by without a new application being discovered for which the Westco Pump with its unique array of characteristics is perfectly suited. We invite every engineer in the oil industry to become acquainted with this outstanding pump which is doing faithful and efficient duty in connection with many of the latest refinery, pipe line and natural gasoline plant installations.

The Westco is made in sizes delivering from 5 to 400 g.p.m. against pressures up to 300 pounds. May be operated in single stage or in pairs to deliver against exceptionally high pressures. Only One Moving Part—No Metal-to-Metal Contact—Wide Operating Range—Perfect Hydraulic Balance—Ball Bearing Construction—Entire Absence of Vibration—Constant Non-pulsating Discharge—Standard Motor Speeds. Further information or quotations supplied on request.

WESTCO-CHIPPEWA PUMP COMPANY
Factory and General Offices—Davenport, Iowa
Branches:
NEW YORK, CHICAGO, SAN FRANCISCO
Distributors in Principal Cities

New Book Proves "Best Seller"

Refinery Engineers Flood Mails With Requests

INTERESTING, VALUABLE, IS VIEW

LOUISVILLE, Ky., March 6, 1930. In the February 16 issue of The Oil and Gas Journal, there appeared an advertisement of Tube-Turns, Incorporated, featuring the offer of a new 20-page bulletin, "Pipe Welding with Stock Fittings in the Process Industries."

This advertisement carried a coupon which, if mailed back to the company, entitled the sender to a free copy of the new bulletin.

Within two or three days after the magazine was put into the mails, requests for the new bulletin began to pour in from refinery engineers. Some of the best-known names in the petroleum refining industry were signed "on the dotted line".

WHAT IT CONTAINS

In response to their inquiries, they received a bulletin which told of the economies arising from the use of Tube-Turns — economies in erection costs, saving in power made possible by reduction of pressure drop, savings in maintenance, savings in insulation costs. They learned how and why Tube-Turns are, weight for weight, the strongest stock fittings on the market.

CHARTS . . . PHOTOS

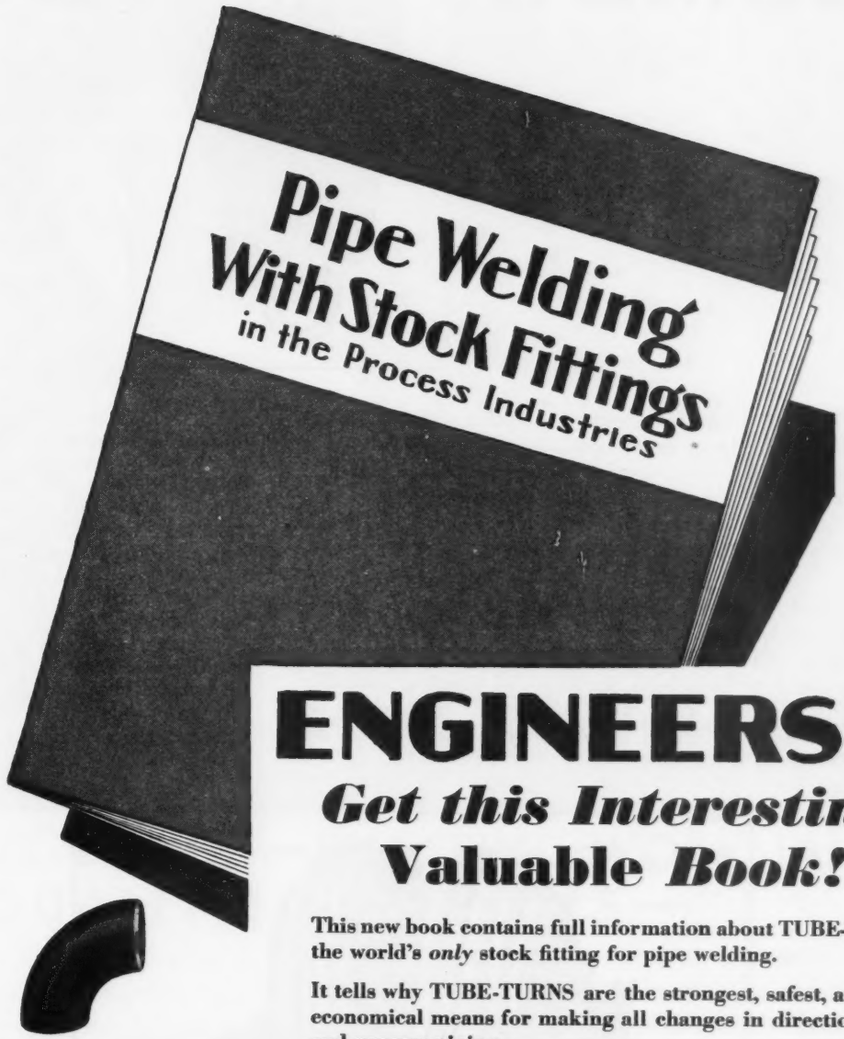
They found charts showing tangible figures comparing the pressure drop of Tube-Turns with that of other short-radius fittings. They saw dozens of photographs illustrating the neat, workmanlike construction afforded by Tube-Turns, and indicating the advantages and economies of Tube-Turns in erection, maintenance, insulation and power.

ANOTHER OPPORTUNITY

If you by any chance neglected to send for the new Tube-Turn Bulletin, you can now get it, as easily as ever, by mailing the coupon of the advertisement at the right. The company will welcome your inquiry—you will incur no obligation. Once you have read their history, Tube-Turns themselves will "sell" you on their advantages and economies for all your piping.

DETROIT DISTRIBUTION

CHICAGO, Mar. 3.—The Shell Petroleum Corp. has built and equipped and is operating a string of 35 service stations at Detroit, Mich. Up to the first of December, the Waco Oil Co. was the distributor of Shell products at the City of the Straits but that company, having been purchased by the Paragon Refining Co. of Toledo, the Shell corporation was left without any real distributor in Detroit. The number of stations may be increased later if the results of the present stations seem to demand the increase. The Shell Petroleum Corp. has bulk storage at Detroit which it supplies by tanker from the refinery at East Chicago at a considerable saving in freight costs as the freight rate from East Chicago to Detroit is .0165 cents per gallon and the cost per tanker is estimated at not to exceed .0038 cents per gallon.



ENGINEERS!

Get this Interesting, Valuable Book!

This new book contains full information about TUBE-TURNS, the world's *only* stock fitting for pipe welding.

It tells why TUBE-TURNS are the strongest, safest, and most economical means for making all changes in direction of oil and process piping.

It shows how and why TUBE-TURNS are now being used by oil companies controlling 80% of the nation's production.

It contains dozens of illustrations showing actual installations.

The photographs and charts alone may suggest numbers of ways to improve *your* piping.

Use the coupon to get your free copy—*today!* No obligation.

TUBE-TURNS

are short-radius, non-porous pipe fittings, forged from seamless steel tubing. Uniform in wall thickness. No thinning, thickening, flattening, or buckling. Safe at *any* temperature or pressure.

Used by oil companies controlling approximately 80% of the nation's production.

TUBE-TURNS, *Incorporated*
***General Offices:* 1311 S. Shelby St., LOUISVILLE, KY.**

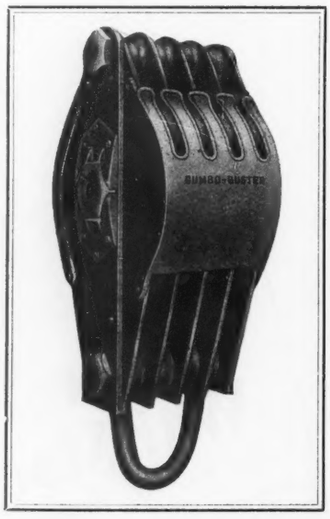
CHICAGO 110 S. Dearborn St. | NEW YORK 30 Church St. | PHILADELPHIA Bourse Bldg.

TUBE-TURNS, *Incorporated*, 1311 S. Shelby St., Louisville, Ky.

Gentlemen: Please send at once my free copy of "Pipe Welding with Stock Fittings". This request does not obligate me in any way.

Name ..... ***Company*** .....

City ..... ***State*** .....

"GUMBO  BUSTER"

The "Gumbo Buster" Traveling Block is equipped with 36″ Roller Bearing Sheaves. The large roller bearings operate on a 7″ center pin which is made from special alloy steel, hardened and ground to size. The center pin is set above the center of the block causing it to land in an upright position. All projecting nuts are guarded and tapered to prevent catching on projections.

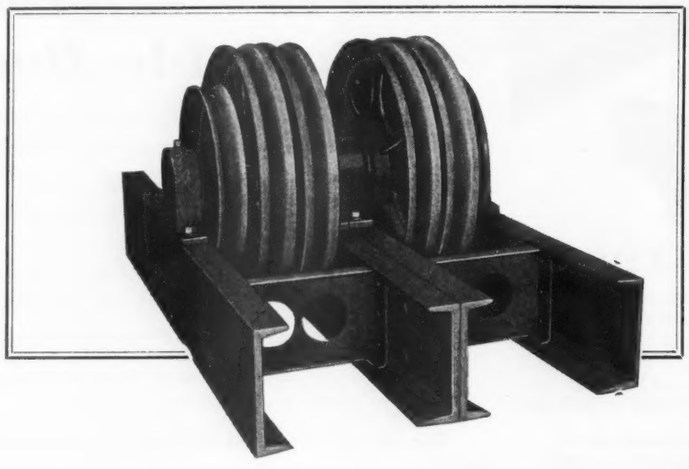
The 66″ traveling block is equipped with steel wire line guards which can be quickly and easily removed from the block and replaced after wire line has been strung up. Each wire line guard is held in place by four large bolts, the heads of which are counter sunk in the guard so they can not be sheared off by catching on racked pipe or other projections. Each roller bearing is oiled by an individual Alemite connection.

The "Gumbo Buster" Straight Line Crown Block has six sheaves mounted on two pins. The outside end of each pin rests in a separate box which is supported by a 50 lb. per foot I beam. The inside ends of the two pins rest in the same box which is supported by two 50 lb. per foot channel irons securely bolted together.

There are four 36″ manganese steel sheaves for drilling line which rotate on large American Roller Bearings. These bearings in turn rotate on hardened and ground steel sleeve which is shrunk on an alloy steel center pin 7″ in diameter. This block meets the recommendations of all wire rope manufacturers.

The outside sheaves are 28″ in diameter and are for the catline and deadline. They are made of semi-steel and operate on a bronze bushing. Each of the six sheaves is lubricated from the end of the pin by an individual Alemite connection.

For convenience in assembling on water table this Crown Block is made so that it can be taken up in two or four sections.



Write Today for Information

Republic Supply Company

OIL AND GAS WELL SUPPLIES

Cable and Rotary Tools

GENERAL OFFICES: HOUSTON, TEXAS

LET POWELL SERVICE ENGINEERS SHOW YOU DETAILS OF MERIT...

DISTINCTIVE DESIGN—EXACTING WORKMANSHIP —QUALITY MATERIALS—

BECAUSE trouble-free valve performance depends on design, workmanship and materials, The Wm. Powell Co. has carefully considered these three elements . . Let Powell Service Engineers give you the details of merit of Powell Products. Let them prove to you Distinctive Design provides for the ever changing demand created through new processes, higher pressures and temperatures. Exacting Workmanship consists of the accurate testing and inspection, whereas Quality Materials account for the long life of Powell Valves . . Let Powell Service Engineers explain to you why Powell Valves have been the accepted standard for valve installations for 84 years.

THE WM. POWELL CO.
2525-31 Spring Grove Avenue, Cincinnati, Ohio

We will have a display in booth No. 131 at the Oil Equipment & Engineering Exposition in Los Angeles, March 16 to 23.

POWELL VALVES

"For every joint on every line"

Ten miles or a hundred—Victaulic-coupled lines assure 100% delivery—because there are no joint leaks.

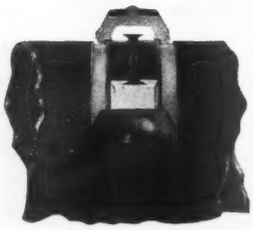
Installation costs are amazingly low.

• • •

Mail the Coupon for Victaulic Bulletin

For all sizes of steel, wrought iron, cast iron and spiral weld pipe—any pressure. Mail the coupon for detailed information.

VICTAULIC COMPANY OF AMERICA
26 Broadway New York



"For every joint on every line"

FLEXIBLE LEAK-PROOF

VICTAULIC

REG. U. S. PAT. OFF.

PIPE COUPLINGS

VICTAULIC DISTRIBUTORS

Mid-Continent and Rocky Mountains
HANLON-WATERS, INC.
Tulsa, Oklahoma

Pacific Coast
DUCOMMUN CORPORATION
Los Angeles and
San Francisco, California

Western Pennsylvania
PITTSBURGH SUPPLY COMPANY
Pittsburgh, Pennsylvania

Illinois, Indiana
BELL and GOSSETT
Chicago, Illinois

Ohio
CASE HARDENING SERVICE CO.
Cleveland, Ohio

Minnesota, Wisconsin, Iowa
F. S. VAN BERGEN
Minneapolis, Minnesota

Canada
D. B. McWILLIAMS
Toronto, Canada

West Virginia and Kentucky
THE McJUNKIN SUPPLY CO.
Charleston, West Virginia

FOR OIL, GAS, WATER, SEWAGE, COMPRESSED AIR, ETC.

For uses, installations, specifications and prices, fill in and mail this coupon.

VICTAULIC COMPANY OF AMERICA
26 Broadway New York

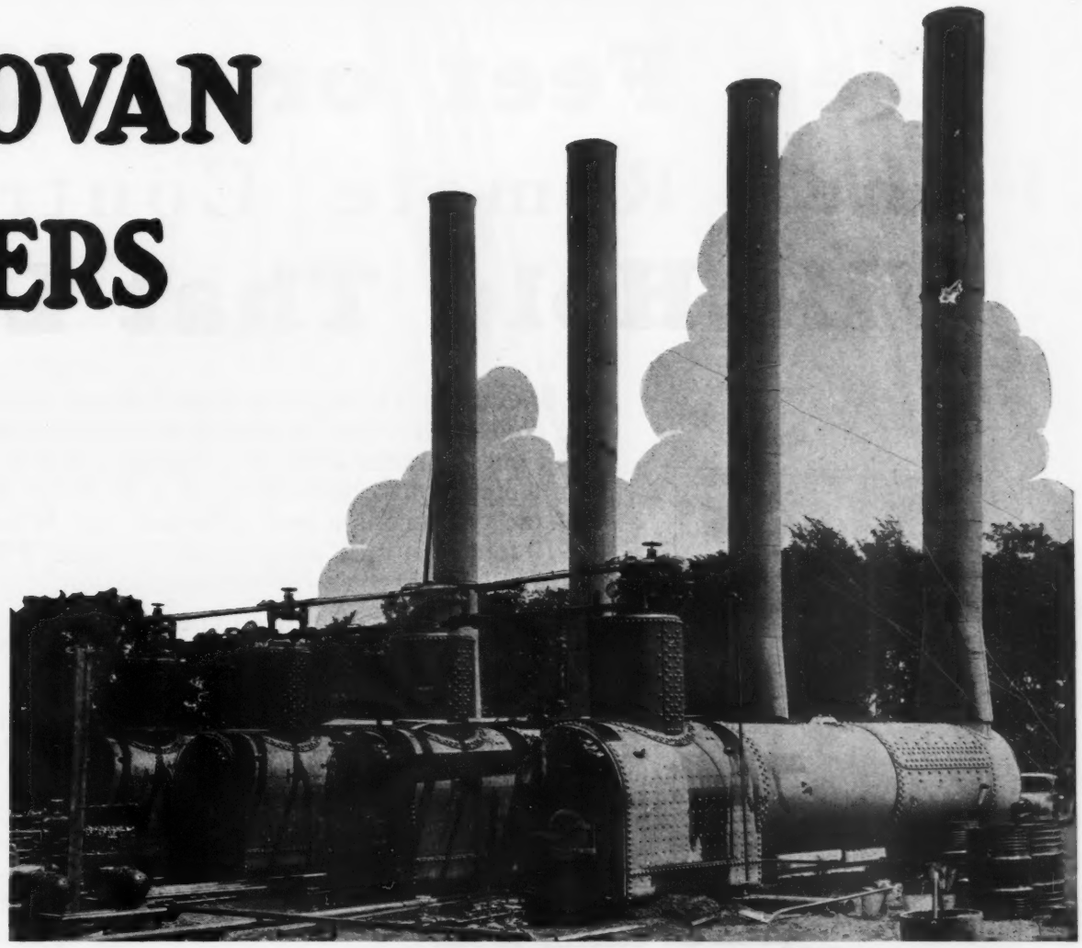
Please send me Victaulic Bulletin No. 1

Name.....

Address.....

DONOVAN BOILERS

ARE MAKING NEW FRIENDS AND BOOSTERS EVERY DAY!



—and that is not only pleasing to us but what we have always tried for.

Recently a man who had never handled a Donovan before was put to work on a battery of them in the Gulf Coast country. The drilling was around 5000′, not easy. It called for real boiler performance.

That this man should have been skeptical was natural, but he soon saw the light. His very words were:

"I sure like these boilers. They are the first Donovans I ever used and they have treated me fine. They do whatever is required and without crowding them. I hope I can stay with this rig for I'd rather quit than lose these boilers."

That is a rather broad statement but it is true and there must be a reason—

To try them is to like them.

Donovan Boilers *are* Consistently Good

Manufactured by

DONOVAN BOILER WORKS, INC.,

PARKERSBURG, W. VA.

NEW YORK OFFICE—30 Church Street
FRICK-REID SUPPLY CORPORATION
Mid-Continent and Eastern Distributors

GREAT NORTHERN TOOL & SUPPLY CO.
MIDLAND IRON WORKS
Montana Distributors

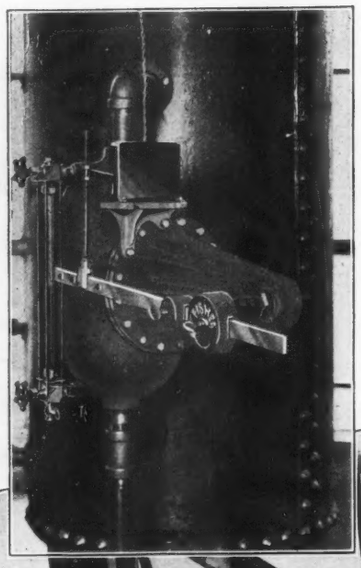
"Ten Feet or a Mile"

Fisher Remote Controllers

Will Hold That Level

Refinery, and Oil and Gas Installations sometimes demand that the controller valve be placed a considerable distance from the float cage. In the days of yesterday this was done with direct connected controllers through a hook-up of wires and chains, but today there is a new efficient way. Whether the valve must be 10 feet or a mile away from the cage, FISHER will build a controller exactly for your installation.

The electric switch unit, Type No. 238, for unlimited operating distances. (Shown at the left.) The Type No. 235 Pilot Valve Unit for operating distances up to 200 feet, (shown at left in center) and the liquid transmission unit, Type No. 240, for operating distances up to 75 feet. (Shown below.)



Left: Typical installation of a FISHER Type No. 238 "Electric Remote Control". This device has an unlimited operating distance range.

Above: "FISHER Pilot Valve Controller" Type No. 235. For operating distances up to 200 feet. Extremely sensitive, positive and dependable.

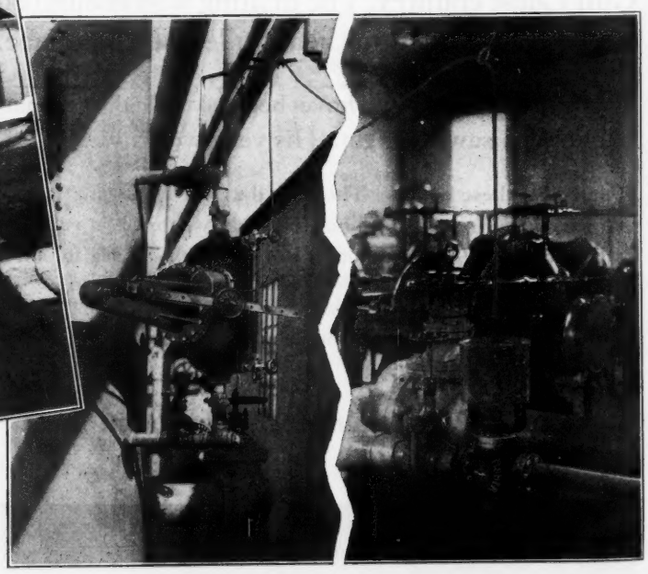
It is but obvious that FISHER should be the *one* manufacturer to develop and perfect these controllers for remote operation. FISHER has been the pioneer in the automatic specialty field for forty years. This is but one of their great strides to advance, not with the oil industry's demands, but *ahead* of them.

Modernize your installations. Assure yourself of positive, sensitive, non-failing liquid level control—Install FISHER.

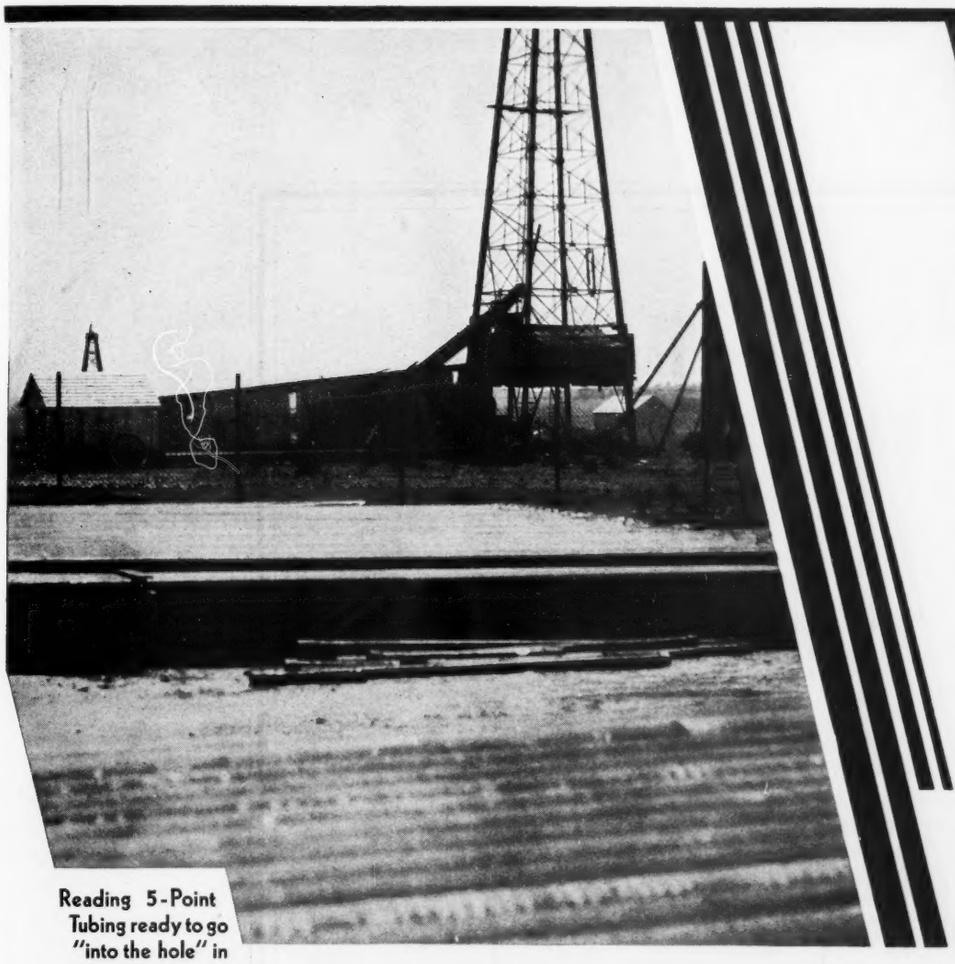
Write for Bulletin No. 35

THE FISHER GOVERNOR CO.

900 Fisher Bldg. Marshalltown, Iowa



Right: The "Liquid Transmission Control" FISHER Type No. 240. For operating distances from 8 to 75 feet.



Reading 5-Point Tubing ready to go "into the hole" in Peabody District, Kansas

Forged Couplings

Just Another Advantage of Reading 5-Point Tubing!

It's easy to understand why Reading Galvanized 5-Point Tubing has gained such wide acceptance in the oil country. All couplings, for example, are forged—not rolled—and the threads are galvanized, too! And when you remember that Reading 5-Point Tubing inherently resists corrosion—that it will not crystallize—and that it holds galvanizing several times more thickly than other ferrous tubing materials—you have a combination that's hard to beat!

All Reading 5-Point Tubing, Casing, and Line Pipe are made of the original, Genuine Puddled Wrought Iron, tested in the toughest fields by generations of use. You'll protect yourself from substitutes by looking for the Reading name and indented spiral mark on every length of Reading 5-Point Pipe.

As an added improvement, all Reading Galvanized Couplings for Reading 5-Point Tubing are now furnished with galvanized threads.

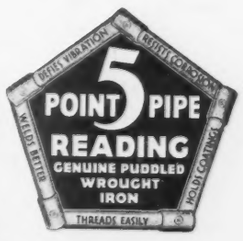
READING IRON COMPANY

Reading, Pennsylvania

Atlanta . Baltimore . Cleveland . New York . Philadelphia . Boston . Cincinnati
St. Louis . Chicago . New Orleans . Buffalo . Houston . Tulsa . Seattle
San Francisco . Los Angeles . Detroit . Pittsburgh . Kansas City

Reading pipe distributed by:

Frick-Reid Supply Corp. . Bradford Supply Co. . Republic Supply Co.
Superior Tube Co. Our own stocks at Houston, Texas

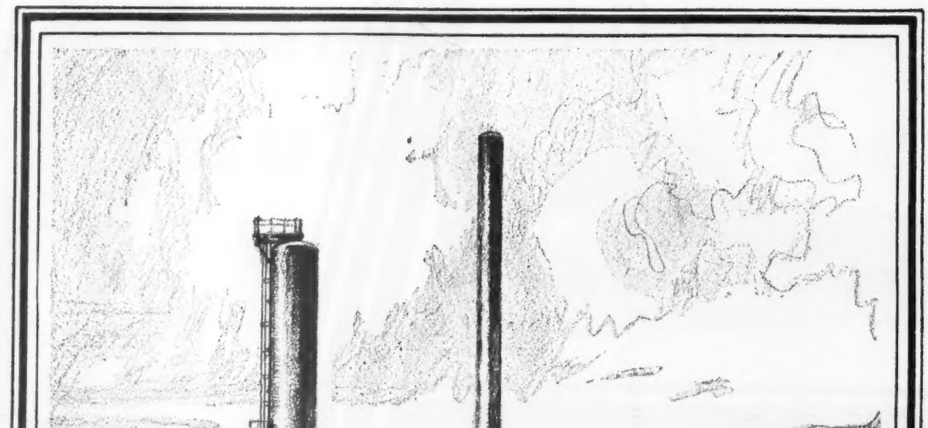


GENUINE PUDDLED WROUGHT IRON

READING PIPE

DIAMETERS RANGING FROM 1/8 TO 20 INCHES

Science and Invention Have Never Found a Satisfactory Substitute for Genuine Puddled Wrought Iron



Kellogg PLACES A FIXED DEFINITION ON SUCCESSFUL REFINERY PERFORMANCE

Kellogg Service begins with design and ends only when this design has been realized in successful refinery performance. To Kellogg, "successful" means performance that enables the refiner to achieve the rated thruput while obtaining maximum yields and products to the specifications desired.

The M. W. KELLOGG COMPANY

225 Broadway, New York

LOS ANGELES, CAL., 1031 SOUTH BROADWAY TULSA, OKLA., PHILTOWER BUILDING

The ADVERTISERS' INDEX

A

Acme Fishing Tool Co. 296
Air Preheater Corp., The 93
Ajax Iron Works .....
Ajax Rope Co. .....
Albertan Publishing Co., Ltd., The 264
Alco Oil Tool Co. .....
Allegheny Steel Co. ..... Inside Front Cover
Allen Air-Turbine Ventilator Co. 284
Allis-Chalmers Mfg. Co. 2
Aluminum Co. of America 39
American Askania Corp. .....
American Asphalt Paint Co. .....
American Cable Co., Inc. .....
American Car & Foundry Co. 167
American Cast Iron Pipe Co. 280
American Fomon Co. .....
American Iron & Machine Works Co. ....
American La France & Foamite Corp. .....
American Meter Co. 137
American Radiator Co. .....
American Rolling Mill Co. 35
American Schaeffer & Budenburg Corp. .....
American Sheet and Tin Plate Co. .....
American Steel & Wire Co. .....
American Steel Works 259
American Telephone & Telegraph Co. .....
American Well Works 292
Anchor Post Fence Co. .....
Andrews Steel Co., The .....
Armstrong Brothers Tool Co. 294
Armstrong Machine Works 17
Athey Truss Wheel Co. 292
Axelson Mfg. Co., Ltd. .....
Ayer & Lord Tie Co. .....

B

Baash-Ross Tool Co. .....
Babcock & Wilcox Tube Co., The .....
Badger, E. B., & Sons Co. 120-121
Baker Oil Tools, Inc. 29
Baldwin Chain & Mfg. Co. .....
Barber-Greene Co. .....
Barco Mfg. Co. 281
Barnickel, Wm. S., & Co. 22
Barnsdall Refineries, Inc. 148-149
Barrett Co., The 267
Bartlett, Hayward Co., The .....
Beaumont Iron Works, The .....
Bell Oil & Gas Co. .....
Bessemer Engine Co. 140-141
Bethlehem Steel Co. .....
Big Lake Oil Co. .....
Bignall & Keeler Machine Works .....
Birmingham Tank Co. .....
Blackor Co. 107
Black, Sivalls & Bryson, Inc. .....
Black Wire Rope Co. .....
Bosch, Robert, Magneto, Inc. .....
Braden Steel Corp. 231
Braun, C. F., & Co. 123-124-125-126-127-128
Brewster Co., The, Inc. .....
Bridgeport Machine Co. 81-259
Bristol Co., The 101
Broderick & Bascom Rope Co. 34
Brown, Arthur C. 298
Brown Instrument Co. 116-117
Brown-Straus Corp. 105
Buckeye Traction Ditcher Co. .....
Buffalo Gasolene Motor Co. .....
Burford Oil Co. 216
Burt Mfg. Co. 295
Butler Mfg. Co. .....
Byron Jackson Co. 83

C

California Manufacturing & Engineering Co. .....
Cameron Tool & Supply Co. .....
Carey, The Philip Co. .....
Caterpillar Tractor Co. .....
Central Alloy Steel Corp. .....
Chain Belt Co. 160-161
Champion Machine & Forging Co., The .....
Chaplin-Fulton Mfg. Co., The 299
Chapman Valve Mfg. Co., The 72
Chestnut & Smith Corp. 263
Chicago Bridge & Iron Works 68
Chicago Pneumatic Tool Co. .....
Cincinnati Advertising Products Co., The 264
Clark Brothers 30
Classified Wants 232-233
Cleveland Trencher Co., The .....
Climax Engineering Co. .....
Colona Mfg. Co. 173
Columbian Rope Co. .....
Columbus Forge & Iron Co., The .....
Consolidated Ashcroft Hancock Co., Inc .....
Continental Supply Co., The 119
Cooke, C. Lee, Mfg. Co. 269
Cooper-Bessemer Corp., The 140-141
Cooper, C. & G. Co., The 140-141
Crane Co. 144-145
Crane Packing Co. .....

D

D. & B. Pump & Supply Co. .....
Darling Valve & Mfg. Co. .....
Dart, E. M., Mfg. Co. .....
Davis, G. M., Regulator Co. 272
Dayton-Dowd 5
Dayton Rubber Mfg. Co., The .....
Dearborn Chemical Co. .....
Detroit Aircraft Corp. .....
Detroit Graphite Co. .....
Dixon Crucible Co., Joseph .....
Dodge Brothers Corp. .....
Doheny Stone Drill Co. .....
Donner Engineering Co. .....
Donovan Boiler Works, Inc. 45
Dow Chemical Co., The .....
Dresser & Gorton, Inc. .....
Dresser, S. R., Mfg. Co. 61
Driftmeter, Inc. .....
Du Pont de Nemours & Co., Inc. E. I. 33
Durametallic Corp. .....

E

Eagle-Picher Lead Co. .....
Economy Pump & Oil Tool Co., The ....
Edelblute Co., T. H. .....
Edward Valve & Manufacturing Co., The 26
Electric Machinery Mfg. Co. .....
Elliott Core Drilling Co. .....
Empire Oil & Refining Co. 261
Emsco Derrick & Equipment Co. 185
Enduro Nirosta Steel Co. .....
Ethyl Gasoline Corp. 265
Exchange Banks of Tulsa .....

F

Fenwick-Reddaway Mfg. Co. .....
First National Bank & Trust Co., The
First National Bank & Trust Co. of Oklahoma City, The 67
Fisher Governor Co. 46
Fisk Tire Co., The .....
Fluor Construction Co. .....
Fort Worth Steel & Machinery Co. .....
Fort Worth Well Machinery & Supply Co., Inc. .....
Foster-Wheeler Corp. 187
Four-Wheel Drive Auto Co., The .....
Foxboro Co., Inc., The 191
Francis, Bro. & Co. 289
Franklin Valveless Engine Co. 196
Frates Co., The .....
Frick-Reid Supply Corp. 87
Fulton Iron Works Co. 277

G

G. & M. Co., Inc. .....
Gardner-Denver Co. .....
Garlock Packing Co. 253
Gaso Pump & Burner Mfg. Co. ..... Inside Back Cover
General Electric Co. 9-223
General Paint Corp. 31
Gilbert & Barker Mfg. Co. .....
Goble, B. G. .....
Goodrich, B. F., Rubber Co., The .....
Goodyear Tire & Rubber Co. .....
Goslin Birmingham Mfg. Co., Inc. .....
Gott, H. P., Mfg. Co., Inc. 294
Goulds Pumps, Inc. .....
Granite City Steel Co. .....
Grant Oil Tool Co. .....
Graver Corp. .....
Gray Processes Corp., The .....
Greenspon's Joseph, Sons, Iron & Steel Co. .....
Griscom-Russell Co. 239
Gulberson Corp. 11
Gulf Refining Co. .....

H

Halliburton Oil Well Cementing Co. 25
Hanlon-Waters, Inc. .....
Harrisburg Pipe & Pipe Bending Co. ....
Haynes Stellite Co. .....
Hazard Wire Rope Co. .....
Heat Transfer Products, Inc. 237
Heeter, Sons & Co., Inc., C. A. 294
Hercules Motors Corp. .....
Hercules Supply Co. .....
Hercules Tool Co. .....
Heydrick Mapping Co. 298
Hill, Hubbell & Co. 31
Hills-McCanna Co. 177
Hinderliter Tool Co. .....
Hough, Charles N., Mfg. Co. .....
Hughes Tool Co. ..... Back Cover
Humble Oil & Refining Co. .....
Hussmann Hotel 296
Hyatt Roller Bearing Co. .....

I

Imperial Belting Co. .....
Imperial Refineries .....
Imperial Royalties Co. .....
Independent Oil & Gas Co. .....
Ingersoll-Rand Co. 131-132
International Cement Corp. .....
International Composition Co., Inc. 296
International Creosoting & Construction Co. 181
International Derrick & Equipment Co., The ..... Front Cover
International Harvester Co. of America 273
International Nickel Co., Inc., The ....
International Supply Co. .....

J

Jackson Co., Byron 83
Jackson Engineering Corp. 75
Jarecki Mfg. Co. .....
Jefferson Union Co. 193
Jenkins Bros. 24
Johns-Manville Corp. 79
Jones & Laughlin Steel Corp. 283
Jones, The S. M., Co. .....

K

Kellogg, M. W., Co., The 48
Kelly, John Eoghan 296
Kennedye-Plumb Corp. .....
Kennedy Valve Mfg. Co., The 262
Kerotest Mfg. Co. 168
Key Boiler Equipment Co. 164-165
Kingham Trailer Co., Inc. .....
Kirk-Morrow Iron Works, The 247
Kohler Co. .....
Koppers Co., The .....
K-W Ignition Corp., The .....

L

Landis Machine Co. 3
Larkin & Co. .....
Layne & Bowler Co. 286
Leach Co., C. H. 12
Leader Iron Works .....
Lees-Bradner Co. .....
Leschen, A., & Sons Rope Co. .....
Leonard Construction Co. .....
Limbert & Co., Geo. B. 110-111
Lincoln Electric Co. .....
Linde Air Products Co. 21
Link Belt Co. .....
Lone Star Gas Co. .....
Longyear, E. J., Co. .....
Lorraine Corp., The .....
Lucey Products Corp. .....
Ludlow Valve Mfg. Co. 299
Ludlum Steel Co. .....
Lufkin Foundry & Machine Co., The ....
Lufkin Rule Co. 296
Lummus, The Walter E., Co. 282
Lunkenheimer Co. 103

M

McAlear Mfg. Co., The .....
McClintic-Marshall Co. 27
McCord Radiator & Mfg. Co. .....
McEverlast, Inc. .....
McEvoy, J. H., & Co. .....
McGregor Working Barrel Co. 298
McIntosh & Seymour Corp. .....
McKee, Arthur G., & Co. 217

M

MacClatchie Mfg. Co. .....
Macwhyte Co. .....
Madison-Kipp Corp. .....
Magnolia Petroleum Co. .....
Maloney Tank Mfg. Co. 257
Manzel Brothers Co. .....
Marion Machine Foundry & Supply Co. .....
Marley Co., The 237
Marsh Gauge Pole Co. 294
Martin-Decker Corp. .....
Mason Regulator Co. .....
Medart Co., The 268
Melcher, A. F. .....
Merco Nordstrom Valve Co. 271
Metric Metal Works 137
Mid-Continent Petroleum Corp. 188
Midwest Piping & Supply Co., Inc. 213
Miller Combination Bailer & Pump Co. .....
Miller Improved Gas Engine Co. .....
Mine Safety Appliance Co. .....
Missouri Portland Cement Co. .....
Moon Mfg. Co., The .....
Moore, Lee C., & Co., Inc. 89-90
Moorlane Co., The 16
Morris & De La Vergne [illegible] 4
Muller Co., The John .....
Munn & Co. 296
Muskogee Iron Works .....
Myers, F. E., & Bro. Co. 290

N

National Lead Co. .....
National Petroleum Engineering Co. 296
National Supply Co. 152-153
National Tank Co. .....
National Tool & Metals, Inc. .....
National Transit Pump & Machine Co. 65
National Tube Co. 32
Natural Gas Equipment Co. .....
Naylor Pipe Co. .....
Nellan, Schumacher & Co. 99
Nitrose Co., The .....
Norris Bros., Inc. .....
North American Car Corp. .....
Northern Pump Co. .....
Novo Engine Co. 293
Nye Tool & Machine Works 7

O

Oakite Products Co. .....
O'Brien Steel Construction Co. .....
Ohio Injector Co., The 38
Oil Conservation Engineering Co., The 276
Oil Countries Specialties Mfg. Co., The
Oil Insurance Assn. 274
Oil Well Improvements Co. 275
Oil Well Supply Co. 103
Oklahoma Contracting Co. 95
Oklahoma Gas & Electric Co. .....
Oklahoma Portland Cement Co. .....
Omar Refining Co. 8
Oxweld Acetylene Co. 21

P

Page & Hill Co. .....
Panyity, L. S. .....
Parkerburg Machine Co. .....
Parkersburg Rig & Reel Co. .....
Parmenter & Selby .....
Parsons Co., The .....
Patrick, R. S. 288
Patterson-Ballagh Corp. 84-85
Pattin Bros. Co. .....
Penberthy Injector Co. 63
Petroleum Engineering Corp. .....
Petroleum Engineering Univ. .....
Petroleum Equipment Co. 269
Petroleum Iron Works Co. .....
Pforzheimer, Carl H., & Co. 290
Phillips Petroleum Co. 176
Pittsburgh Equitable Meter Co. 287
Pittsburgh Screw & Bolt Corp. 173
Pittsburgh Steel Products Co. 20
Pittsburgh Valve, Foundry & Construction Co. 15
Polbielniak, W. J. 298
Pomona Pump Co. .....
Powell, William, Co. 43
Power Piping Co. .....
Prescott Co., The 256
Pressed Steel Car Co. .....
Prest-O-Lite Co., Inc., The 21
Protective Metals, Inc. .....
Public Service Co. .....
Pure Oil Co. .....
Pyle National Co. .....

R

Raigorodsky, P. M. 298
Reading Iron Co. 47
Reading Steel Casting Co., Inc. .....
Peece Wooden Sole Shoe Co., Inc. 292
Reed Roller Bit Co. .....
Regan Forge & Engineering Co. .....
Reid, Joseph, Gas Engine Co. 23
Republic Iron & Steel Co. 220
Republic Supply Co. 42
Robinson Orifice Fittings Co. .....
Ross-Meehan Foundries Co. .....
Russell Mfg. Co., The .....
Ryan Aircraft Co. .....
Ryerson, Joseph T., & Sons, The 6

S

Safety Gas Main Stopper Co. 296
St. Louis Surfacer & Paint Co. .....
Schramm, Inc. .....
Selden Co., The .....
Shaffer Oil & Refining Co. 195
Shaffer Tool Works .....
Shaw, S. F. .....
Sheldon Machinery Corp. .....
Shell Petroleum Corp. .....
Sherwin-Williams Co. .....
Shippers' Car Line Corp 298
Shreveport-El Dorado Pipe Line Co., Inc. 295
Sinclair Refining Co. 243
Sivyer Steel Casting Co. 156-157
Skelly Oil Co. 115
Smith, A. O., Corp. 18-19
Smith Engineering Co. .....
Smith Co., E. M. .....
Smith, H. C., Mfg. Co., Inc. .....
Smooth-On Mfg. Co. 278
South Chester Tube Co. .....
Southern Cornice Works .....
Southwestern Engineering Corp. 59
Southwest Welding & Mfg. Co. .....
Spang & Co. 279
Spang, Chalfant & Co., Inc. .....
Spengler Tool Co. 2
Springfield Wagon & Trailer Co. .....
Standard Power Equipment Corp. .....
Standard Steel Works .....
Star Drilling Machine Co. .....
Starrett Co., The L. S. 285
Steiner, George 298
Stockham Pipe & Fittings Co. 175
Stoody Co. .....
Stork Engineering Co. .....
Strom Steel Ball Co. .....
Strong, Carlisle & Hammond Co., The ..
Strong Oil Tool Co. .....
Sutthers-Wells Co. .....
Sullivan Co., The .....
Sullivan Machinery Co. 10
Sun Shipbuilding & Drydock Co. 266
Sureshot Torpedo Co. 298
Swartwout Co., The .....
Swedish American Prospecting Corp. 292

T

Taubman Supply Corp. 73
Taylor Instrument Companies .....
Templeton, Kenly & Co., Ltd. .....
Terry Steam Turbine Co., The .....
Texas Creosoting Co. .....
Texas Power & Light Co. .....
Thermoid Rubber Co. .....
Timken Roller Bearing Co. 76
Titusville Forge Co. .....
Titusville Iron Works Co., The .....
Toledo Pipe Threading Machine Co., The 289
Trackson Co. .....
Transcontinental Oil Co. 204
Trimont Mfg. Co. 258
Truman-Smith Construction Co. .....
Tube Turns, Inc. 41
Tulsa Boiler & Machinery Co. 170-171
Tulsa Chamber of Commerce .....
Tulsa Sheet Metal Co. .....
Twin Disc Clutch Co. 270

U

Union Carbide & Carbon Corp. 21
Union Mfg. Co. .....
Union Wire Rope Co. .....
Universal Engineering Co. .....
Universal Oil Products Co. 134-135

V

Vallez Rotary Filter Co. .....
Veg Co., The .....
Vitrefrax Co. of America 44
Victor Balata & Textile Belting Co. ....
Victor Welding Equipment Co. .....
Vogt, Henry, Machine Co. 179

W

Wagner Electric Corp. .....
Wailes, Dove-Hermiston Corp. .....
Wall Rope Works, Inc. .....
Walworth Co. 1
Warren Petroleum Co. 255
Washburne, Chester W. 298
Waukesha Motor Co. .....
Wesco-Chippewa Pump Co. 40
Westcott Valve Co. .....
Western Gas Construction Co., The .....
Westinghouse Electric & Mfg. Co., The .. 14
West Texas Utilities Co. .....
White Co., The .....
Wickwire Spencer Steel Co. .....
Wico Electric Co. .....
Wiemann-Kammerer-Wright, Inc. .....
Wilgus Mfg. Co., The .....
Williamette Ersted Co. .....
Williamsport Wire Rope Co. .....
Williams Tool Corp. .....
Wilson-Snyder Mfg. Corp. .....
Wilson Welder & Metal Co., The .....
Winkler-Koch Engineering Co., The ... 13
W-K-M Co., The .....
Wood Shovel & Tool Co., The .....
Worthington Pump & Mchy. Corp. .. 36-37
Wright Mfg. Co. .....
Wyatt Metal & Boiler Works .....

Y

Yale & Towne Mfg. Co. .....

Z

Zero Hour Torpedo Co., The .....
Zwetsch, Heinzelmann & Co. 285

The Oil and Gas Journal

PRODUCING REFINING ENGINEERING MARKETING

VOL. 28. NO. 42. TULSA, OKLAHOMA, MARCH 6, 1930

Copyright, 1930, by The Petroleum Publishing Co.

TABLE OF CONTENTS

SPECIAL ARTICLES

California Production Is Curtailed ... 51
By Andrew M. Rowley
Wilbur Suggests Refinery Curtailment ... 53
By C. O. Willson
Unit Operation in East and Abroad ... 54
To Reduce Venezuela Production ... 54
By A. E. Mockler
Lively Debate on Tariff Amendment ... 55
By Charles E. Kern
"Study Situation," Says W. S. Fitzpatrick ... 55
Salt Water Disposed of By Seepage ... 56
By L. G. E. Bignell
Creveling Sawed Way Through College ... 57
By Thomas F. Smiley
Development of Foreign Refineries ... 58
By Charles E. Kern
New Division Needed (Editorial) ... 60
Advantages of Germ Process ... 62
By Bert H. Lincoln
Field Problems and Their Solution ... 88
Pipe Line Construction News ... 94
Arkansas River Valley Possibilities ... 98
Bureau of Mines Annual Report ... 214
Vacuum Oil Co. Explains Merger ... 244
Flood-Water Purification Problems ... 248
By A. S. Behrman

ANNUAL REFINERY NUMBER

Executives View Refinery Outlook ... 112
Lowering Crude Oil Storage Losses ... 118
Engineering Department, Anglo-Persian Oil Co.
Corrosion in Cracking Coil Tubes ... 122
By Briand Mead, S. S. Shaffer and E. Camp
Storage of Cracking Stock in Areas Without Crude ... 122
By Paul Truesdell
Properties of Tomorrow's Gasoline ... 129
By T. A. Boyd
Future Trends in Petroleum Research ... 129
By C. D. Dean
Sulphuric Acid Treatment Reviewed ... 130
By L. C. Beard, Jr.
Much to Master in Chemistry of Oil ... 133
By Alfred W. Nash
Processing Panhandle Crudes ... 136
By C. C. Benz
Capacity Nears Four Million Daily ... 138
By C. O. Willson
Survey of Operating Refineries ... 138
Shut-Down Refineries Survey ... 162
Acid Recovery Unit in Small Refinery ... 166
By E. J. Mary
Electricity in Refinery Operation ... 169
By W. H. Creel
Raoult's Law in Column Calculations ... 169
By George A. Burrell
Expand Cracking Plants in Rumania ... 172
By Gustav Egloff
Simple Analysis of Heat Interchange ... 178
By E. G. Ragatz
Applying Thermodynamics to Cracking ... 182
By George A. Burrell
Acid Refining of Naphthene Base Oils ... 184
By M. K. Thornton, Jr., C. C. Neighbors and J. R. Keith
Solving Gum Problem in Motor Fuels ... 186
By H. P. Rue and Ralph H. Espach
Temperature Control in Oil Refining ... 189
By R. D. Bean
New Type Knock-Testing Apparatus ... 190
Refinery Cost Versus Selling Price ... 192
By F. E. Holsten and C. E. Votrian
Remove Acid Sludge With Centrifuges ... 194
Research Department, Smith Engineering Co.
Fuels and Lubricants for Aircraft ... 197
By Dr. C. K. Francis
Continuous Operation in Cracking ... 200
By S. V. Williams
Problems in Application of Control ... 201
By C. E. Masons
Distillation Methods Change Rapidly ... 202

FIELD OPERATIONS

Late Fields ... 64
Oklahoma, *By W. A. Spinney* ... 66
North Louisiana-Arkansas, *By D. H. Bancroft* ... 69
Kansas, *By W. A. Spinney* ... 70
Southwest Texas, *By B. D. Stevenson* ... 71
Gulf Coast, *By Neil Williams* ... 74
Rocky Mountain Area, *By T. R. Ingram* ... 77
Canada, *By Victor Lauriston* ... 77
California, *By L. P. Stockman* ... 78
Michigan, *By Special Correspondent* ... 78
Central West, *By Whit* ... 82
Kentucky-Tennessee, *By Whit* ... 82
Eastern Fields, *By D. S. Wakenight* ... 86
West Texas, *By L. E. Bredberg* ... 91-278
North Texas and Panhandle, *By L. E. Bredberg* ... 92-278
East Central Texas ... 209

REFINING AND MARKETING

Lower Prices on Export Shipments ... 52
By C. O. Willson
Technical Questions Answered ... 199
Weather Helps Chicago Furnace Oil ... 234
Lower Prices Mark East Coast Trade ... 235
Natural Gasoline Manufacture ... 237
Brief Items for Petroleum Refiners ... 238
Refinery and Crude Prices ... 240-241
Tank Wagon Quotations ... 242
Of Interest to Sales Departments ... 254

ARTICLES OF GENERAL INTEREST

The Advertisers' Index ... 49
Natural Gas Developments ... 100
Men Known in Oildom and Personals ... 102
Equipment and Supplies ... 104-106-108
Classified Want Advertisements ... 232-233
Oil Securities Market ... 244-245
Crude Petroleum Statistics ... 300

BE A REGULAR READER

The Oil and Gas Journal Tulsa, Okla.

Beginning at once, mail The Oil and Gas Journal to me every week for one year. Enclosed find $6.00.

I am engaged in the Division of the Petroleum Industry as checked below:

- ☐ Producing
- ☐ Refining
- ☐ Natural Gasoline Manufacturing
- ☐ Pipe Line
- ☐ Equipment

Name ----------
Title ----------
Company ----------
Address ----------
City ----------
State ----------

Refinery Section Starts on Page 234

California Production Is Curtailed

Highest daily average estimated total production in 1929, week ended Aug. 24, 2,975,435 bbls. Lowest in 1929, Dec. 27, 2,595,320 bbls.

Success of Present Effort Means Much to Entire Industry. Government Recommends Reduced Refinery Runs

Highest daily average estimated light oil production in 1929, week ended Sept. 14, 2,534,524 bbls. Lowest in 1929, Apr. 13, 2,142,036 bbls.

By Andrew M. Rowley

A substantial reduction in production in California during the past week was the most encouraging development the petroleum industry has enjoyed in many months. It means a determined effort is being made on the part of a majority of the operators on the Pacific Coast to hold the output of crude oil more nearly to market requirements and indicates the possibility of success in the movement to bring production down to the estimated needs of 609,000 barrels daily.

It is felt such a reduction in output will permit the industry to maintain the present price schedule. There is little or no doubt that failure of the present effort will result in drastic reductions in the crude oil price schedule in California. Success of the present movement means so much to the entire industry the refusal of a few operators to co-operate should not be permitted to stand in the way of successful action by the remainder.

That the Government is cognizant of the effect on the general situation of the burdensome stocks of gasoline is indicated by the suggestion of Secretary of the Interior Wilbur, who also is chairman of the Federal Oil Conservation Board, that refiners curtail their output. As has been pointed out frequently too much gasoline is being manufactured and prosperity for the industry this year—both for producers and refiners—depends to a very large extent on what success is attained in reducing present stocks of gasoline.

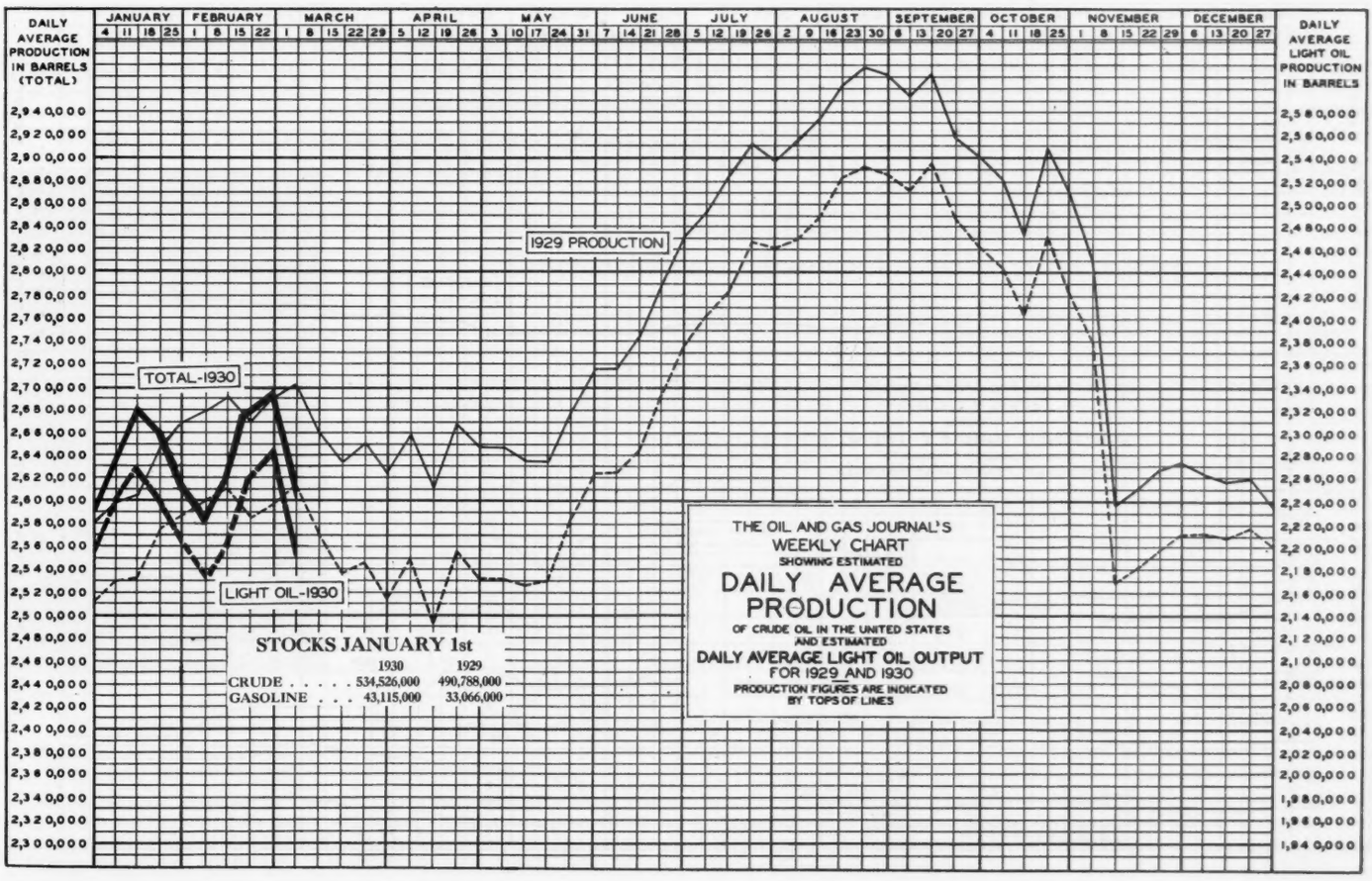
Little hope for an increase in crude oil or gasoline prices can be held as long as the quantity of gasoline in storage is so much greater than during previous years. If the industry begins quickly to draw upon these stocks there would be every reason to expect a strengthening in the price structure for both crude oil and gasoline by the time the main consuming season gets under way.

PRODUCTION IN THE UNITED STATES

Estimated daily average production of light and heavy gravity oil in the United States for week ended March 1 and a comparison with the previous week follows:

	March 1		February 22	
	Light	Heavy	Light	Heavy
Oklahoma—				
Oklahoma City	83,860	.....	88,535	.....
St. Louis-Pearson	43,285	.....	45,020	.....
Seminole	205,560	.....	230,910	.....
Northern miscellaneous	228,335	.....	225,970	.....
Southern fields	55,475	.....	55,555	.....
Total Oklahoma	616,515	.....	645,990	.....
West Texas—				
Hendricks	91,425	.....	89,480	.....
Yates	140,510	.....	137,148	.....
Remainder	110,960	.....	112,038	.....
Total West Texas	342,895	.....	338,666	.....
North Louisiana	36,775	5,020	36,575	5,120
Arkansas	16,850	41,660	16,775	41,390
North Central Texas	130,990	.....	132,975	.....
Texas Panhandle	89,050	.....	89,055	.....
East Central Texas	25,786	.....	25,226	.....
Kansas	114,520	.....	110,280	.....
Total Mid-Continent area	1,373,381	46,680	1,395,542	46,510
Gulf Coast	.....	203,897	.....	197,689
Southwest Texas	.....	62,794	.....	63,924
Eastern	136,000	.....	138,000	.....
Rocky Mountain area	78,446	.....	73,431	.....
California—				
Santa Fe Springs	165,000	.....	215,000	.....
Long Beach	111,000	.....	118,000	.....
Huntington Beach	41,000	.....	41,000	.....
Elwood	40,000	.....	35,000	.....
Ventura Avenue	54,000	.....	64,000	.....
Seal Beach	29,000	.....	34,000	.....
Remainder of State	175,000	103,000	173,000	104,000
Total California	615,000	103,000	680,000	104,000
Total United States	2,202,827	416,371	2,286,973	412,123
Grand total	2,619,198		2,699,096	

→ **Total Decrease, 79,898 Bbls.; Light Oil Decrease, 84,146 Bbls.** ←



Lower Prices on Export Shipments

Oklahoma Refinery Contracts on Kerosene and Gasoline Now in Line With Domestic Market. Motor Fuels Slow

By C. O. Willson

With no important changes in domestic prices, refiners in Oklahoma and other Mid-Continent areas during the past week saw their export prices on all grades of gasoline reduced one-half cent and on kerosene 1 cent.

The reductions which were announced Thursday, February 27 became effective immediately in all contract shipments between export companies and Mid-Continent refiners. Four of the larger export companies which have been buying consistently from month to month, recently placed orders for aproximately 16,000,000 gallons of the 390 and 375 endpoint grades for March delivery. Refiners in all of the Mid-Continent areas shared in this business.

This March business as usual was based on the prices established on the Gulf Coast by the Export Petroleum Association, Inc. The prices which were established on January 19, 1929, were as follows: 58-60 U. S. Motor gasoline 8½ cents; 60-62 400 endpoint, 9½ cents; 61-63 390 endpoint, 9¾ cents; and 64-66 375 endpoint, 10 cents. In contract agreements it has been customary for Mid-Continent refiners to secure 2¼ cents under the Gulf Coast prices, basis North Texas, the 2¼ cents covering freight to the Gulf Coast terminals, handling charges and profit to the buyers.

Thus, previous to the reductions, Mid-Continent refiners had been receiving 7½ cents for their 375 endpoint gasoline and 7¼ cents for 390 endpoint gasoline, basis North Texas. With the reductions announced effective on all March shipments these net prices are all lowered one-half cent.

The 1-cent reduction in export kerosene prices was more drastic. The prevailing export prices at the coast since last June were 7 cents for the 41-43 prime white kerosene, and 8 cents for the 41-43 water white grade. On the gasoline contract basis this netted the Mid-Continent refiners a price of 4½ cents for the prime white and 5½ cents for the water white, basis North Texas. These prices have now been reduced 1 cent. This reduction in kerosene, however, is not as important as in the case of gasoline. Exporters have not been buying much kerosene on a contract basis making their purchases from time to time on the spot market in line with domestic prices.

REFINED MARKET BAROMETER

General reductions in kerosene and gasoline export prices during the past week tended to further emphasize the weakness in these products which has been apparent in the domestic market for several months. These reductions will materially lower the revenue of many coastal and inland refiners who dispose of a part of their gasoline and kerosene output in export channels. The domestic market in these products has not shown general improvement although many refiners report an improved movement in both products. Natural gasolines continued firm in both California and Mid-Continent. Fuel oil, including gas oil and distillates, continues sluggish and prices have been lowered in several areas. The situation in regard to lubricants and wax was mixed. There has been considerable price cutting in both the domestic and exports market in cylinder stocks where large orders were at stake. At the same time an improved demand for pale and red oils was reported in the coastal areas. Prices were reduced on several grades of wax by coastal refiners while the Mid-Continent and Pennsylvania market was more active.

Mid-Continent—Refiners with export contracts affected by lowering of prices at coastal points. Kerosene market also weaker following reduction in export prices. Domestic demand for gasoline not so active. Fuel oil, gas oil and distillate weak. No change in lubricants. Natural gasoline steady. More inquiries for wax.

East Coast—Lowering of export prices on gasoline reflected in further weakness in domestic market. Kerosene export lower. Cylinder stocks weak. Fuel oil sluggish. Several grades of wax lower. Price cutting in gas oil.

Pennsylvania—Kerosene prices stronger. Some grades of wax advanced. Minor changes in other products.

Chicago—Fair demand on contracts for gasoline. Kerosene inactive. Fuel oils quiet. Little demand for distillates.

Gulf Coast—Export gasoline and kerosene prices lower. Better demand for pale and red oils. Fuel oil and gas oil prices firm.

California—Better feeling in refined market due to efforts being made to curtail crude oil production. No price changes.

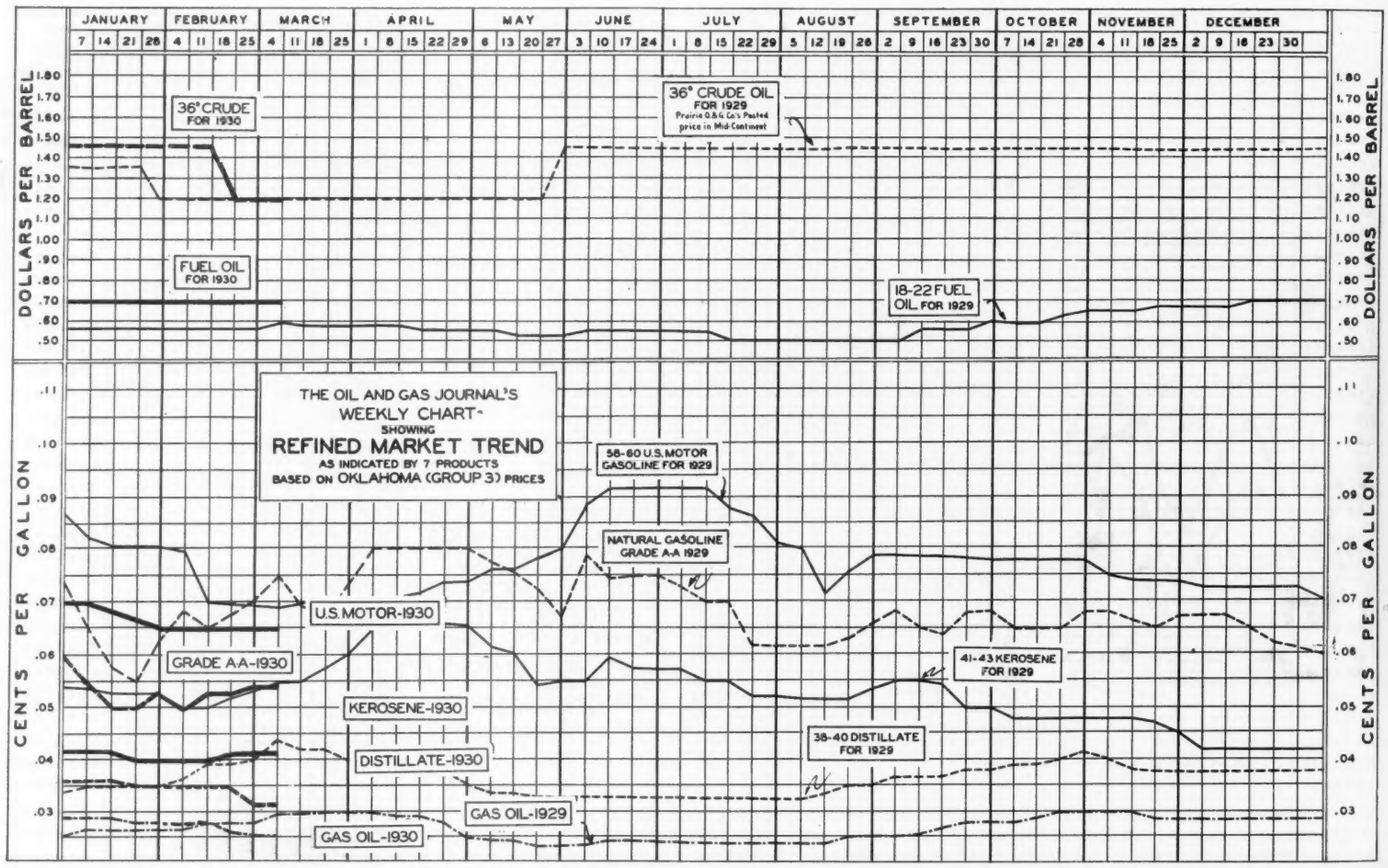
Significance of Reduction

The significance of the reduction in Coastal export prices can be summarized with the statement that it has brought the Mid-Continent export prices in line with the domestic market. The action of the export association in reducing the prices after maintaining firm quotations in gasoline for more than a year carries out the prediction of those who have felt that export quotations ultimately would have to reflect a fundamental weakness which has prevailed in the domestic gasoline market throughout the greater part of the past year.

The export association was formed the latter part of 1928 and has in its membership all the leading export companies including the Shell interests. It was organized to bring about stable conditions in export prices, thus assuring a more orderly procedure in foreign markets. Constant fluctuations in prices which are characteristic of the domestic market in this country seriously disturb foreign markets and were said to be threatening the participation of American companies in these important outlets.

The application of the export association plan has brought both commendation and criticism from Mid-Continent refiners during the past year. The criticism came early in the year when domestic prices on gasoline advanced to the point where they were higher than the export basis. Exporters ceased to make purchases and it was felt that the lack of this business was an important

(Continued on Page 251)



Western Refiners Meet in Shreveport

Annual Meeting of Executives and Manufacturers Committee to Be Held March 10, 11 and 12. Jones Retires as President

Shreveport, La., will be the mecca for the Mid-Continent refiners on March 10, 11 and 12 when the membership of the Western Petroleum Refiners Association assembles in that city for the annual meeting of executives and the association's manufacturers committee.

The annual meeting, which is the eighteenth for the association, climaxes the

Howard Bennette
Managing Director of Western Petroleum Refiners Association

most active year in its history. A year ago the board of directors approved an expansion program in the association's activities and this has been carried out with an enlarged staff at the Tulsa headquarters. The membership has grown until it now includes all the refining groups of the Mid-Continent area with several members in other areas.

The economic developments in petro-

A. V. Bourque
Secretary

leum refining and marketing have been stressed during the past year in the staff work of the association with particular attention paid to the place of the Mid-Continent refining industry in the general industrial scheme. It is expected that the Shreveport meeting will result in a further discussion of these problems and a program outlined for the coming year.

Relative to this matter the current bulletin of the association in announcing the annual meeting stated:

"It seems unnecessary to stress the fact that refiners' affairs are at a critical stage in the Mid-Continent during the present year, nor that the advice and suggestions of the member executives are both more desirable and necessary now than in any period of our affairs. Refiners, like nations, can no longer claim a splendid isolation. They stand or fall as they co-ordinate themselves with their neighbors and their neighbors' problems."

ANNUAL MEETING, WESTERN PETROLEUM REFINERS ASSOCIATION

WASHINGTON-YOUREE HOTEL, SHREVEPORT, LA.
March 10, 11 and 12

MONDAY, MARCH 10

Luncheon—12 M. Followed by president's annual message and election of officers.

Address by Houston Dunn, secretary and treasurer of the National Petroleum Mutual Fire Insurance Co.

TUESDAY, March 11

Manufacturers' Committee Meeting. L. R. Crawford, Producers & Refiners Corp., Chairman.

Opening Session—1:30 P. M.

"Specifications of Natural Gasoline"—S. S. Smith, Shell Petroleum Corp.

"Non-Metallic Protective Linings for Petroleum Refining Equipment"—Dr. J. C. Morrell, Universal Oil Products Co.

"Fire-Fighting Equipment in the Refinery; Its Maintenance and Use"—E. E. Kerns, Louisiana Oil Refining Corp.

WEDNESDAY, MARCH 12

Morning Session—9:30

"Instruments for Refining, Operation and Laboratory Testing"—C. L. Huffman, Tagliabue Manufacturing Co.

"Handling and Shipping Natural Gasoline" — Emby Kaye, Skelly Oil Co.

Afternoon Session—1:30

"Depreciation of Refinery Equipment"—L. D. Mann, Empire Oil & Refining Co.

"Use of Waste Heat in Cracking Fuel Oils" — B. P. Crittenden, Louisiana Oil Refining Co.

Annual Meeting

The annual meeting for executives will take place Monday noon at the Washington-Youree Hotel. A luncheon will be followed by a business session which will conclude with the annual election of officers.

Roy B. Jones, president of the Panhandle Producing & Refining Co., Wichita Falls, Tex., who retires this year after two years service as president of the association, will present the annual president's message at this meeting. Mr. Jones, who heads one of the oldest re-

H. K. Davis
Economist

finery organizations in the Mid-Continent Field, will discuss the more important problems confronting the membership with definite suggestions as to future plans. It is felt that Mr. Jones' final message as president will be one of the

(Continued on Page 246)

Wilbur Suggests Refinery Curtailment

Excessive Stocks of Gasoline Responsible for Recommendation. Humble to Make Plan Effective

By C. O. Willson

The suggestion of Dr. Ray Lyman Wilbur, Secretary of the Interior and chairman of the Federal Oil Conservation Board that refineries in California, Texas and Oklahoma shut down on Sunday to prevent a further overproduction of refined products is impracticable, according to views expressed by representative refiners in the states concerned.

Secretary Wilbur's suggestion regarding the one day a week shutdown was sent to the governors of the three states last week. The letter stated:

"The Federal Oil Board would like to call to your attention the existing situation in regard to the refining of crude oil since it seems desirable to point out to the refiners of the country the advantages that would accrue from Sunday closing at the present time. The stocks are higher than they have been since 1927, while the domestic demand is only up to the level of 1928.

"In other words, the increased efficiency in the cracking of oil combined with the seven-day week is increasing gasoline stocks to a level where there will be a large element of waste. Therefore the Federal Oil Conservation Board wishes to suggest that the refining of petroleum could well be brought to the normal basis of a six-day week. If you feel that you can be helpful in calling this to the attention of these interests in your state it would be appreciated."

It was stated in Washington that Governor Young of California had replied that he would be glad to do what he could in helping carry out the purpose of the oil board. Governor Moody of Texas has replied that the carrying out of such a plan would materially reduce the market for crude petroleum and increase the present surplus of that product. As an alternative, Governor Moody suggested that the board ask importers of crude petroleum to reduce their imports. No reply had been received the first of the week from Governor Hollaway of Oklahoma who was out of the State at the time the letter was received in Oklahoma City.

Refiners' View

While there has not been sufficient time for general discussion among refiners regarding Secretary Wilbur's proposal those who expressed their opinion said a complete shutdown at their refineries one day a week would greatly increase operating costs. It was suggested, however, that a plan of running as much crude oil in seven days as they had been running to their stills in six days might be a solution of the problem. Refiners generally are in agreement with Secretary Wilbur's statement that an oversupply of refined products, particularly gasoline, exists and some curtailment of this output is desirable in the immediate future.

In regard to a one-day shutdown it is pointed out that practically all phases of refinery processing are based on continuous operation throughout the entire year. Refinery processing is primarily a distillation operation and efficiency demands that this be maintained continuously except for shutdowns for cleaning or repairs. It is said that a shutdown on Sunday would require cutting fires on Saturday and all of Monday would be required to get the various operating phases back to a normal basis. Thus a one-day shutdown would mean a loss in time of from two to three days.

The head of one large refining organization believes that the desired curtailment of operations could be better obtained by working out a plan in which refinery operators would reduce their crude runs to stills so that in a seven-day period the total runs would be equal

(Continued on Page 246)

Unit Operation in East and Abroad

Report Presented Before Petroleum Section, A.I.M.E., Gives Result of Extensive Survey on Proposition

By E. L. Estabrook and H. H. Hill*

This report summarizes the information that was obtained by the committee on unit operation in eastern United States and in the foreign countries.

In the foreign countries, practically all of the operations in noncompetitive fields are on concessions or leases to a single company and for that reason do not represent consolidation of operating or royalty interests. In as much as it was not possible to obtain detailed information on the unit operations now under way in the various foreign countries, the present report gives only a brief summary of these in existence and an idea of their relative importance in the immediate petroleum picture of the world. The data that have been promised on the different projects will be embodied in future reports.

Eastern United States

The only examples of unit or near unit operations east of the Mississippi are furnished by a few prospective gas fields and by a number of repressuring projects. There are several small pools operated by single companies and in some cases, no royalty interests are involved as the land is owned in fee by the operating company. In the repressuring projects that have been organized on the unit plan the companies pool their acreage and the operations are carried out by a single operating company. In a number of other repressuring projects the several companies operate their own properties but in accordance with a co-operative agreement between the companies involved. This plan has worked satisfactorily in many cases.

Examples of co-operation between companies as a means of reducing operating expenses and in limiting the number of wells to be drilled, are furnished by agreements between the gas companies in southwestern Pennsylvania, the drilling of water wells on property lines in the Bradford Field and in the well-spacing program adopted in the Mount Pleasant Field in Michigan. As a result of co-operative agreements, the gas companies operating in southwestern Pennsylvania were able to shut in 270 wells, including 16 gas purchase contract wells, during the past summer in Armstrong, Allegany, Washington, Westmoreland, Clarion and Green County, Pennsylvania.

In the Bradford Field in Pennsylvania and in the Allegany Field in New York, all companies co-operate in the development of boundary lines for water flooding by drilling the initial water wells along the property lines and dividing the cost equally between the adjoining operators.

In the Mount Pleasant Field in Michigan, where one company owns approximately 60 per cent of the acreage, a spacing program of one well to 10 acres and with wells 330 feet from the property lines was initiated by that company and is being followed by other companies. This program represents a decided contrast to the exceedingly close spacing followed in the highly competitive fields near Saginaw and Muskegon where a large number of unprofitable wells were drilled and in the latter field immense quantities of gas were wasted before pipe lines could be constructed to consumers 2 miles away.

Unit Operations in Foreign Fields

Canada—In New Brunswick, an area of 10,000 square miles has been leased by one company and a producing field covering an area of approximately 3 square miles has been developed. About 100 wells have been drilled since the field was opened and during 1928 approximately 8,000 bbls. of oil were produced.

In Alberta, examples of unit operation are furnished by three gas fields, two operated by one company and one by another company. A prospective oil field in the same province will probably be operated by one company as a near unit.

Mexico—One company operates two pools, the Filisola and Tonala Fields on the Isthmus of Tehauntepec. These fields produced 2,415,000 bbls. in 1928 and it is estimated the production in 1929 was in excess of 7,000,000 bbls.

A number of joint operating agreements have been made between companies in Mexico as a means of reducing costs both in the development and operation of properties.

Venezuela—The following important producing fields in Venezuela are each operated entirely by single companies: Mene Grand, present production approximately 53,000 bbls. daily; El Mena present production approximately 5,000 bbls. daily, and La Paz—Concepcion—not producing at present.

Other producing fields operated by single companies but not considered as major fields at present are: Rio Tarra, Rio de Oro and Guanoco. Possible fields that will be operated by single companies have been developed at Urumaco and Quite-Quire, but at present there is no outlet for the production.

In the competitive producing fields, along the eastern shore of Lake Maracaibo, the Ambrosia, La Rosa, Punta Benitez, Tia Juana and Lagunillas Fields, the three companies interested have made joint agreements from time to time on well spacing and on other drilling and producing problems.

Colombia—The two producing fields, Infantas and La Cira, are operated by a single company. The production from these fields in 1928 amounted to 19,895,677 bbls., an average of about 54,500 bbls. daily.

Peru—The production in Peru is controlled by two companies which operate in separate areas. In 1928 one company produced an average of 25,966 bbls. daily from one general district while the other company produced an average of 6,523 bbls. daily from the other area.

Ecuador—The production of Ecuador amounting to approximately 1,090,000 bbls. in 1928 is practically all obtained from the properties operated by one company.

Argentina—All of the important producing fields in Argentina are operated on a competitive basis.

Bolivia—Although no production is being marketed from Bolivia, large concessions have been granted to two American companies and any fields that may be developed will no doubt be operated on the unit plan.

Trinidad—Some of the smaller pools in Trinidad are operated as units while in the competitive pools there are large consolidated blocks operated by single companies. In many cases there are co-operative agreements between the companies on developing the boundaries of the properties. The Trinidad government discourages competitive drilling by prohibiting the drilling of wells within 150 feet of the boundary of a property and encourages centralized operations in the different areas by setting up "spheres of influence" around newly developed leases.

Europe

France—The operations at Pechelbronn where oil mining is being employed are under one organization and can be classed as unit operations. The production of this area amounted to approximately 500,000 bbls. in 1928.

A small field at Gabain in the south of France is operated under the supervision of the Department of Mines, and although this furnishes an example of unit operations, the production of the field amounts to only a few barrels daily.

Germany—The operations in Germany are competitive but an attempt has been made to consolidate a number of properties in one area now being tested.

Italy—The four small producing fields are operated by single companies. There is no competition in the different fields as concessions are granted by the government covering each producing area completely.

Rumania—All producing fields in Rumania have been developed on a competitive basis as the land is divided into small plots seldom exceeding 100 acres, and in many cases as small as 2 acres. However, the companies operating in the different fields co-operate in determining casing programs, spacing of wells and in the exclusion of water.

Poland—Operations in Poland in the past have been highly competitive but recently a joint company has been in-

(Continued on Page 208)

*Before A.I.M.E. New York meeting. Copyright, 1930, by A.I.M.E., Inc.

To Reduce Venezuelan Production

Richard Airey Announces Royal Dutch-Shell Is Ready to Co-operate on Curtailment in Line With American Producers

By A. E. Mockler
New York Bureau, The Oil and Gas Journal

NEW YORK, Mar. 3.—World unity in petroleum production curtailment is expected to become a reality this year with curtailment of Venezuelan production in line with similar reductions in crude output in this country. Royal Dutch-Shell has announced, through Richard Airey, president of Asiatic Petroleum Co., Ltd., a Shell subsidiary, its willingness to participate in any movement looking to a reduction in Venezuelan crude production in 1930, proportionately with an average reduction in United States production on the same basis.

This offer by Royal Dutch-Shell, it is declared, is made in response to the resolution adopted by Oklahoma producers last December, when they voted to continue crude oil production curtailment in Oklahoma fields. The resolution by the Oklahoma operators provided that the attention of oil producers in Venezuela and other foreign countries be called to their action. The resolution of the Oklahoma oil men, after reciting the steps taken in this country to cut production, declared that these conservation measures might prove ineffective and break down unless producers in Venezuela and other foreign areas adopted similar conservation plans, "because the problem of petroleum conservation is international and not merely sectional in its scope."

Gentlemen's Agreement

Leading producers in Venezuela some time ago were credited with having consummated a "gentlemen's agreement" under the terms of which no additional construction of pipe line or lake tankers would be undertaken during the current year. This agreement, in effect, meant that 1930 output of Venezuela would be held substantially to 1929 levels, in as much as production at the close of 1929 was taxing transportation facilities to the utmost. Now, however, Royal Dutch-Shell evidently proposes to go a step further, and curtail its Venezuelan operations through the actual shutting down of production, on condition that United States producers match this action by similar steps in fields in this country.

Venezuela during 1929 produced in the aggregate approximately 137,400,000 bbls. of crude oil. Of this total, Royal Dutch was credited with approximately 50 per cent. More than 33⅓ per cent of the total world production of the Royal Dutch-Shell group came from Venezuela in 1929. The importance of curtailment in Venezuela is clearly evident when it is considered that that country in 1929 ranked second only to the United States as a producer of crude oil.

Of the total output of 137,400,000 bbls. of crude in Venezuela last year, the United States received 50,637,000 bbls. This was a substantial increase over the 46,977,000 bbls. imported into the United States from Venezuela in 1928, and was supplemented by heavily increased imports of gasoline from West Indian refineries drawing crude supplies from Venezuela last year. A total of 8,868,000 bbls. of gasoline was imported during 1929, compared with 4,198,000 bbls. in the previous year, an increase of more than 100 per cent. Estimates regarding probable gasoline imports for 1930 vary, but the most conservative places the expected total at between 13,000,000 and 15,000,000 bbls. for the year.

Definite Co-operation

Royal Dutch-Shell at various times has come in for considerable criticism among American oil men for its rapidly expanding operations in Venezuela, and consequent heavy shipments of Venezuelan crude into the United States. Royal Dutch-Shell, however, for more than a year past has signified its willingness to co-operate with other producers in Venezuela in a curtailment program, but without much success until a short time ago. Pan American, which ranks second to Royal Dutch-Shell as a producer in Venezuela through Lago Petroleum, a subsidiary, completed construction during 1929 of a 110,000-bbl. refinery at Aruba, D.W.I., adjacent to Venezuela, and was thus confronted with the necessity of building its crude output up to a point where its refinery's requirements could be supplied. Other companies continued in the race for position last year.

Recent depression in world oil markets has reached the point where international leaders of the industry have realized the necessity of definite co-operation in stemming the flow of crude, and the present offer of Royal Dutch-Shell is the first move in such a campaign.

Sir Henri Deterding, managing director of Royal Dutch-Shell, made a similar offer on the occasion of his visit to New York in March of 1929, at which time he evidently found other companies operating in Venezuela unwilling to agree to a conservation movement in that country.

Lively Debate on Tariff Amendment

Vote in Senate 27 For and 39 Against. Wirt Franklin Appears Before Lobby Committee. Letters and Telegrams Read

By Charles E. Kern
Washington Bureau, The Oil and Gas Journal

WASHINGTON, D. C., Mar. 1.—The proposed tariff on petroleum was defeated in the Senate last night by vote of 27 to 39. On the previous day the lobby committee of the Senate sent its secretary to Wirt Franklin's headquarters in the Mayflower Hotel and requested that the records of the Independent Petroleum Association be turned over to the committee. This was done without question and letters and telegrams were transferred to the capitol where they formed the basis of criticism over the manner in which the campaign for an oil tariff had been conducted. Charges were made that a coalition had been agreed upon between interests demanding tariff concessions on lumber, sugar, and oil and later it was not denied that conversations looking to such an arrangement had at least taken place.

The lobby committee opened its session in the Senate Office Building with Wirt Franklin as the single star witness and for two and a half hours he was subjected to hostile questioning and criticism based almost entirely upon the correspondence that had been accumulated at the Mayflower Hotel here since the arrival of the special train that brought the oil delegations from Oklahoma and other states.

The large room was crowded when Senator Caraway called his committee to order, other members of the committee bein Senator Robinson, of Indiana, Republican; Senator Blaine, Wisconsin, Republican; and Senator Walsh of Montana, Democrat.

Before Lobby Committee

When Mr. Franklin gave his occupation as a producer, refiner, and marketer of oil the chairman sarcastically asked him whether there was any oil production or refining in the District of Colombia and told him there was no need of fencing as the committee wanted to know what his business was in Washington.

Mr. Franklin: "I am not fencing. I haven't anything to conceal whatever."

Senator Caraway: "Well what have you been doing here?"

Mr. Franklin: "I have been here in the interest of getting a tariff on oil. That is not my occupation, though. I have been presenting the plight of the independent oil producer to the members of both the House and the Senate."

Asked whom he had seen, he said he had talked personally to Senators Watson, Grundy, Walsh, Ashurst, Shortridge, Robinson of Indiana, Thomas, Pine, Borah, Deneen, Brookhart, Capper, Allen, Goldsborough, Frazier and Nye. He was questioned in respect to the expenditures of the committee which he said since the party left Oklahoma would amount to about $50,000 and the expenses of running his headquarters were about $200 a day including everything.

Senator Caraway: "Is there anybody here representing these interests on a salary or contingent basis or otherwise?"

Mr. Franklin: "No, sir, I want to say to you that as president of this association I have refrained from employing anybody although solicited on numerous occasions by different people to do so, because the oil men have come here to present this question themselves."

Senator Caraway: "I was rather interested in seeing a couple of men very busily engaged around here and I just wanted to know if they were in your employ."

Mr. Franklin: "Well, if anybody has been employed, I do not know it, I have opposed the employment of anybody and if that has been done it has been over my protest, against my will, and without my knowledge."

Tariff Trading

Senator Caraway wanted to know whether the oil interests had been trading votes with senators who were endeavoring to get tariff concessions on lumber and sugar.

Mr. Franklin: "I have heard that suggestion. I don't know that you would call it trading."

Senator Caraway: "We both know what trading is, you know."

Mr. Franklin: "There has been a suggestion that, perhaps if senators wanted one item on the tariff list protected it might help to unite forces. I have understood all my life that that is the way a tariff bill is made."

Senator Caraway: "You may have had some very accurate information on that."

The witness had never heard of leather mentioned in the uniting of forces.

Mr. Franklin, replying to Senator Walsh, said his association was organized at Colorado Springs last June when it was learned for the first time that the purpose of the so-called conservation policy was to shut in American oil to make room for more imports.

Mr. Franklin: "It became apparent at that meeting that the underlying purpose of the so-called conservation policy was not conservation but reservation of American oil in order to make room for imports on behalf of three groups, Royal Dutch-Shell, the Mellon group, and the Standard Oil Co. group. We became very much worked up over that. We organized then for the purpose of promoting the tariff and trying to educate the public as to the purpose behind the conservation movement."

The witness said delegates had come to Washington in the interest of a tariff from Colorado, Wyoming, Utah, New Mexico, Kansas, Oklahoma, Texas, Louisiana and Arkansas. Since the special train arrived members of the association had come from West Virginia, Pennsylvania, Indiana, Ohio, Illinois and California. He explained methods for collecting money to finance the association and, in reply to questions, said the Wirt Franklin Petroleum Corp., and the Cromwell Franklin Oil Co., each had assets around $20,000,000 and he owned independent oil interests that ought to be worth, outside of those companies, about $10,000,000 if they will ever be able to produce oil, but as long as the oil is shut in the ground those interests would be valueless.

Telegrams Read

Senator Walsh exhibited a telegram from M. C. McMahon addressed to Mr. Windbourn, attorney general of Colorado. Mr. Franklin could not identify Mr. McMahon but said the attorney general of Colorado had come to Washington representing the governor of Colorado in the interest of an oil tariff. Judge John P. Adams of the Colorado Supreme Court was also shown to be interested in the tariff from the standpoint of the development of Colorado oil which never could be produced, the witness said, as long as oil is being imported. One of these telegrams said Senator Waterman of Colorado was much interested in an oil tariff.

Senator Blaine: "You used high pressure on the two Colorado senators on February 14. You knew they were not going to vote for a tariff on oil."

Mr. Franklin: "I was trying my best to convince them that we ought to have a tariff. Attorney General Windbourn was endeavoring to have them vote for the tariff."

Senator Walsh read from the correspondence to show that U. S. Stone had said that if there was no tariff provided for oil he would introduce a resolution to show the differential between the prices of crude and refined oil. This referred to Representative Stone of Oklahoma.

Senator Walsh: "I suppose if he gets the duty he will not do that."

Mr. Franklin: "I did not follow that up because I did not consider this a political question at all."

The witness then declared that both the Republican and Democratic platforms carried planks in favor of a tariff

(Continued on Page 206)

"Study Situation," Says Fitzpatrick

Chairman of Board of Prairie Oil & Gas Co. Presents His Views Regarding Conditions in Petroleum Industry

By W. S. Fitzpatrick
Chairman of the Board, Prairie Oil & Gas Co.

I do not care to become involved in the controversy with economists and statisticians concerning the present situation in the oil industry, but it is my opinion that a lot of economic discussion and alleged statistical information is being used in this controversy very much like poison gas was used in the World War. It is time, in my judgment, that the people in every section of the country who are interested financially, or otherwise, in the oil industry, should learn what the actual conditions are and soberly set about to devise means for their own protection.

Competition in the oil industry has gone wild. There are many kinds of competition. Competition to serve and build for the development and prosperity of an industry is helpful and worthy, but competition which only destroys the property values of competitors; deprives honest men of remunerative labor; and undermines the prosperity of an industry, for the sake of placing the dominance and control of a great and essential industry in the hands of one individual or corporation is wrong.

Important Units

There are only a few, and far too few, large integrated units—so called—or companies that carry on in all branches of the industry throughout the country, from the production of oil to its distribution among actual consumers. There are thousands of other important units engaged in the various branches of the business with a very large aggregate capital investment, entitled to all the rights and privileges belonging to corporations and individuals in this country, and just as essential for the protection of the consuming public as any single large unit. It is important that these people, seriously take stock of the situation, understand conditions as they actually exist, know where the responsibility lies for present unsatisfactory conditions, and adopt means and measures for their own self-protection when such conditions and responsibility are known and understood.

Everybody, at all familiar with the oil industry, as it has been developed and is now carried on between the Mississippi River and the Continental Divide, know who forced drilling and air-lift equipment, which resulted in the enormous overproduction in the Seminole Pool in 1926-7. They know who and what units have cooperated, and under what circumstances they have co-operated in restraining production since such efforts have been urged and employed. They know where the statistical and economic information came from that made the oil of Panhandle seem to be so grossly inferior to Mid-Continent crude oil that the price for Panhandle oil had to be reduced. They recall that according to the statistical and economic information passed out at that time all tankage and pipe lines employed in the storage and handling of Panhandle crude oil should have been eaten up and ruined before now, and that refinery equipment operated on that grade of crude oil would have to be renewed every 12 months. They also know how soon it was after the reduction in price of Panhandle crude oil that the technicians and experts discovered that all the information put out a few months before for the purpose of justifying a price reduction in the Panhandle, was wrong because it was then stated that the crude oil from Panhandle, Texas, was of much better quality than at first it was thought to be, and that the difficulties in handling it did not exist. We were then assured that the value of Panhandle, Texas, crude oil was so nearly the equivalent of Mid-Continent crude oil from Oklahoma and Kansas that the price for those crude oils had to be reduced on account of the supply and price of the Panhandle crude oil. And they know many other things along the same line—nor can they forget that in the early days of development in Kansas and Oklahoma, that crude oil was represented fo contain products of little value.

Who Is an "Independent"?

I have noticed recently in the papers considerable comment with reference to the so-called independents in the industry. I wonder if there is such a thing as an independent engaged in the oil business? Certainly it has been recently made to appear that the united action and effort of all but two or three of the larger units are unable to maintain a reasonable price for crude oil based on average cost of production. It is being demonstrated every day that any sizeable company can break the price of refined products to a point below the cost of average refinery operation. Under these conditions, who is to be flattered by being called independent?

In some quarters there is an apparent disposition to make this controversy

(Continued on Page 208)

Salt Water Disposed Of By Seepage

Oklahoma City Operators Completing Plant Which Will Employ a System of Cofferdams Along the North Canadian River

By L. G. E. Bignell
Petroleum Engineering Editor

Operators in the Oklahoma City Pool, faced with the problem of getting rid of salt water produced with oil coming from the silicious lime area, have adopted a plan which is new in the Mid-Continent Field and which is expected to eliminate trouble from this source. At this time it is understood that about 40,000 bbls. of water is produced daily and that the quantity is increasing steadily. Wells drilled into the sand formations in that field are not making any water at present.

Because of the value of the land adjacent to this field and the location of the leases with regard to the city property and the farms that surround the oil pool it seemed necessary to find some way of disposing of this water other than by running it into ponds where it could be held and permitted to evaporate.

It was found impracticable to dispose of the water by putting it back into the ground as is done in some fields in West Texas where there is a porous formation a few hundred feet below the surface that can be used as a storage reservoir. By drilling wells into this porous formation it was found that all the water produced from wells in the Hendricks Pool, Winkler County, Texas, could be disposed of easily. This water has not reappeared in any of the wells so far as known.

Along the Gulf Coast and in some of the California fields it has been found practical to impound the salt water in shallow ponds and permit it to run into the bayous and marsh land along the coast at seasons of the year when the heavy rainfall reduced the salt contents by dilution.

In California some elaborate concrete pits have been built where the salt water is evaporated and the solids settled out until the dilution is so low that the water can be run off into the streams or sea without violation of laws. These pits are usually made in pairs so that one side can be cleaned when necessary while the other side is still in use.

Combination of Methods Adopted

After a careful study of all the known methods of disposing of salt water produced along with the oil it was decided that the best method that could be used in the Oklahoma City Pool was a combination of several of the above-mentioned systems, with the final disposal in the North Canadian River by seepage.

The water from the individual leases will be gathered into a large pond that is to be located in the southwest portion of the field, and from there it will be pumped to a system of cofferdams along the banks of the North Canadian River and so built as to prevent the water from reaching the stream except by seepage through the sand bottom of the cofferdams. This will tend to purify the water, and it is believed that considerable evaporation will take place in the gathering pond at the edge of the field.

As this water is corrosive, serious consideration was given to the kind of pipe that could be used, for it was found that the main pipe line would have to be not less than 20 inches in diameter and some of the longer gathering lines will be 12 or 16 inches in diameter.

Cast iron pipe has been used in many of the lines in other fields but in the 20-inch size this would have made much heavy pipe necessary, and it was decided that as the main line never would be required to carry over 125 pounds pressure the Naylor type spiral pipe could be used.

Corrosion Next Problem

The next problem was to find some means of coating this pipe inside and outside so that it would not corrode and it was essential that this coating be homogeneous and continuous. To coat at the mills and then ship in railway cars and truck to the field did not seem practical for by that method it was almost certain that the coating would be broken and require patching in the field as the line was laid.

It was decided that the pipe should be shipped from the factory with one coat of protective coating applied there. Then it would be coated inside and outside with a heavy application of biturine materials in the field.

Operations along the water disposal line between Oklahoma City Field and the North Canadian River.

A common method of applying such a coating is to pour the hot liquid over the pipe and wipe it on with a piece of cloth or spread with a brush, but in this instance that method would perform only half the work, for it was required that the pipe be coated inside as well as outside.

Hill, Hubbell & Co. engineers together with the engineers for the salt water disposal plant project and the pipe manufacturers decided it would be best to hot-dip each joint of pipe in the field and then haul the dipped pipe direct to the ditch to be buried.

The chemists for the coating company had a problem in working out such a plan because it has been found that an organic compound of this type if boiled for several hours in the usual type of cast iron field kettle will lose many of its lighter constituents and form a coke at the bottom of the vessel.

This continuous boiling also seemed to have the effect of making the enamel hard and brittle and some fear was expressed as to the feasibility of heating huge vats of the primer and enamel and having a satisfactory material for application without large loss through discarding the coke and residues at intervals.

Fear Found Groundless

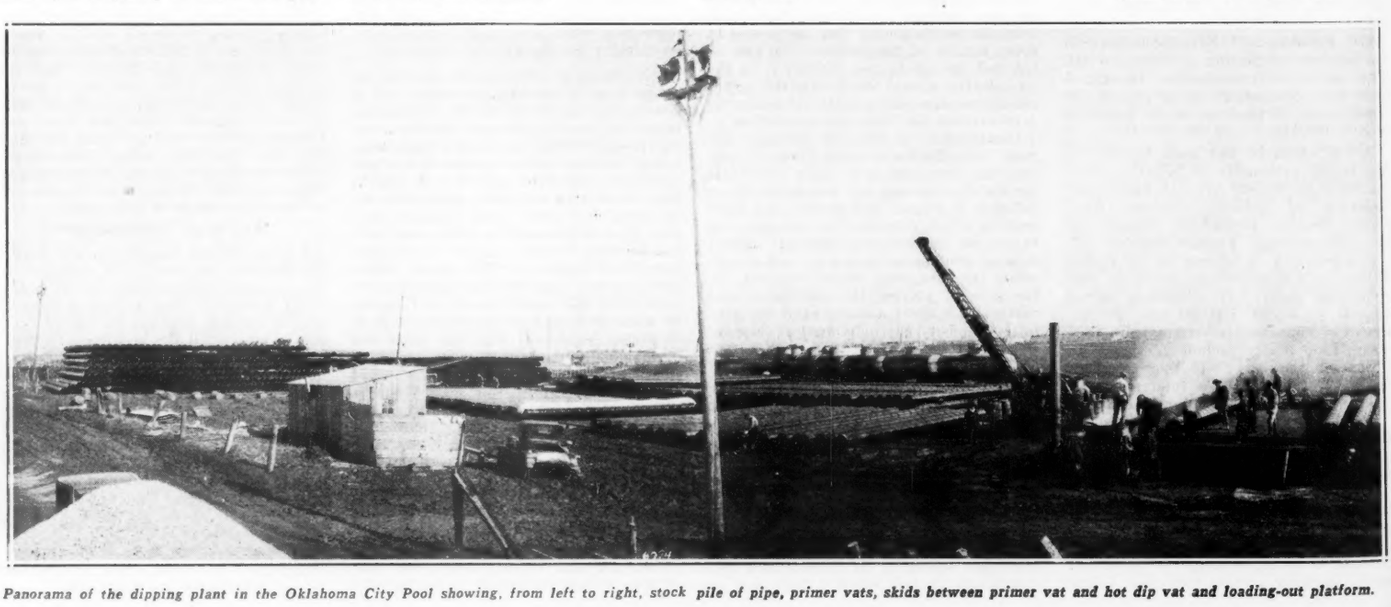
The advantages of this field coating system outweighed this one possibility of trouble, and it developed that the fear was groundless for actual field work has proven that the coating is even better than that obtained by the older methods of application.

The main line requires the use of 41,400 feet of 20-inch Naylor Toncan metal pipe that weighs about 35 pounds per foot and comes in 40-foot joints. Each joint therefore will weigh approximately 1,400 pounds and the total shipment of this size pipe will weigh about 725 tons.

In addition to the main line there will be 13,600 feet of 16-inch and 7,900 feet of 12-inch Naylor pipe used for the gathering lines in the field. This covers the orders of one company only. Other companies will use more pipe of this and other kinds for gathering lines so the problem of coating is one of importance.

The pipe is shipped from the factory in gondola type cars and given a shop coat of paint. It has been found that cin-

(Continued on Page 246)



Panorama of the dipping plant in the Oklahoma City Pool showing, from left to right, stock pile of pipe, primer vats, skids between primer vat and hot dip vat and loading-out platform.

Creveling Sawed Way Through College

Head of Doherty Natural Gas Department Learned Carpenter's Trade and Turned It to Account in Getting on in the World

By Thomas F. Smiley

There's nothing about Joseph D. Creveling, head of the natural gas department of Henry L. Doherty & Co., suggestive of screwdrivers, augers, plumb bobs and tenpenny nails, but the fact is he sawed his way through school as a carpenter. Even after he was a school principal, and they called him "professor," he continued to turn his practical knowledge of tools to account through the summer vacation months.

It is said that every man, no matter how modest and self-effacing he may be as a rule, is cocky about some one thing—his golf game maybe, his ability to pass any other six-cylinder car on the road, or his taste in ties. Mr. Creveling's weakness in this particular is not difficult to uncover. He is distinctly, confessedly and incurably vain over the fact that he learned the carpenter's trade under his Uncle John Creveling, who was recognized as one of the most expert and workmanlike craftsmen around Mount Vernon, Ohio.

Joseph Creveling was born in Mount Vernon in 1884, passed his boyhood in that pretty town and graduated from its high school. Then he attended Ohio Wesleyan College, Delaware, Ohio, graduating in 1906 and receiving his master of science degree the next year. Two years of postgraduate work in the Massachusetts Institute of Technology followed. The young man specialized in applied mechanics here and graduated as a member of the class of 1909 in mechanical engineering.

Seven to Six for $2.25

Joe had finished his sophomore year at Ohio Wesleyan when, in the summer of 1904, he did his first work for the Logan Natural Gas & Fuel Co., with which he was to be associated for years thereafter. He used to drive with horse and buggy (the automobile was still in the experimental stage then) from his home in Mount Vernon to Bangs, 5 miles distant. He worked as a carpenter and received $2.25 a day. Ten hours constituted a day's work, which began at 7 in the morning and ended at 6 in the evening, with an hour off at midday for lunch. Joe's Uncle John, who was then boss carpenter for the gas company at Bangs, got $3, which looked like pretty good pay in that day and locality.

Beginning the next year, 1905, young Joe himself was put in charge of the company's construction work each summer, and what was equally important, he got $3 per day, which looked bigger than any remuneration he has received since. Virtually all of the Logan Natural Gas & Fuel Co.'s construction work was done in the three summer vacation months.

Each summer Joe saved enough out of his pay as a carpenter to meet most of his expenses at school the next winter. He added a little to his income by serving as assistant in surveying and physics at Ohio Wesleyan while he was attending that institution. Before he had completed his course at Massachusetts Tech he had to borrow a little money, which he paid back later.

Five Years as School Principal

His schooldays over in 1909, Joe went to Quincy, Ill., where he taught mathematics and science in the high school for a year. He was in charge of athletics too, for he had been active in athletic sports throughout his high school and college days. Five years as principal of the high school in Portsmouth, Ohio, came next. Portsmouth is on the Ohio River, but as Mr. Creveling points out it was not unusual in times of high water for the Ohio River to be on Portsmouth. In this period Mr. Creveling became a Mason, "going through the chairs" of Aurora Lodge No. 48 and becoming worshipful master.

Each year until 1915, with one exception, Mr. Creveling returned to the Logan Natural Gas & Fuel Co. as engineer in charge of construction. In the spring of 1913 he was sent to Bigheart (now Barnsdall), Okla., where he supervised construction of what is now the Tallant compressor station of the Empire companies. The Bigheart district was extremely wild country in those days. Roads were little more than vaguely marked trails. But the experience was a valuable one in many respects for the young engineer.

In 1915 Mr. Creveling was construction engineer for the Ohio Fuel Supply Co., with headquarters in Columbus, Ohio. The next year he returned to the Logan Natural Gas & Fuel Co., which put him in charge of all its construction work. He devoted special study to the building of compressor stations and gasoline plants.

Mr. Creveling's service with the Doherty organization began August 1, 1918, when he went to Bartlesville, Okla., as construction engineer for the Empire Companies, a subsidiary of the Cities Service Co. and like all the other Cities Service subsidiaries, operated by Henry L. Doherty & Co. A year later he was transferred to the New York headquarters of the Doherty interests as head of the Natural Gas Department. He has continued in that capacity ever since.

Plant Efficiency Increased

The Cities Service Co. in 1919 had scattered natural gas properties in Ohio, New York, Texas, Oklahoma, Kansas, Missouri and Canada. Mr. Creveling began a careful survey of these properties with the object of introducing such improvements as would put them in the highest possible state of efficiency. It also was his job to acquire other plants and to put these, as well as the plants already owned by the company, on a better foundation. Results of his management soon were apparent.

Within a few years Mr. Creveling had traveled 40,000 miles by rail, visiting the company's widely separated properties and getting them on a sounder, more economical basis of operation. In recent years he has passed much less time than formerly rolling about the country in Pullman cars, owing to the fact that an increasing amount of his attention has been demanded by various complicated problems that have arisen in the natural gas industry and particularly those attending the program of a company engaged in a great plan of expansion and of thorough organization. All new acquisitions of natural gas plants by Cities Service are made on recommendation of Mr. Creveling after he has conducted an investigation.

Some of the more recent developments in the program of Cities Service expansion under Mr. Creveling's direction are the purchase of the Kansas City Gas Co. and Wyandotte County Gas Co.; purchase of the Wichita, Hutchinson and Newton natural gas companies in Kansas; building of the pipe line from Amarillo, Tex. to Kansas City, Mo.; formation of the Colorado Interstate Gas Co., making natural gas available for Denver and other Colorado communities; acquisition of control of the Natural Gas & Fuel Corp., Arkansas Natural Gas Co. and Insull natural gas interests in Shreveport, La., and vicinity and merging of this group of companies in Louisiana and Arkansas into the Arkansas Natural Gas Corp.; acquisition of natural gas distribution properties in Little Rock, Ark., and in Independence and St. Joseph, Mo.

World's Worst Sailor

In the spring of 1929 Mr. Creveling returned from an extensive Mediterranean cruise, declaring himself entitled to the distinction of being the world's worst sailor. He avers that just seven seconds

(Continued on Page 246)

UNCLE JOHN CREVELING GETS HIS DUE

The practice of attributing life's successes and triumphs to the little woman has become so deeply rooted in the human male that to recognize any other source of inspiration or help is counted insurrectionary.

Joseph D. Creveling

The winner of the election, the victor in the prize fight, the defaulting cashier acquitted by a jury that sobbed over his lawyer's plea—each tells the reporters who crowd around him, "I owe it all to the girl back home. I must send her the good news right away."

But Joseph D. Creveling, who has attained an influential place in the natural gas industry and who had to make his own way from the start, doesn't seem to care a whoop what they do in such cases. When it comes to giving credit and pointing with pride he unreservedly and unhesitatingly names his Uncle John, boss carpenter.

When Uncle John Creveling undertook to build a new house or repair an old one the man employing him knew that the job would be done right. There would be no skimping, slighting or covering up of bad spots. And Joseph D. learned carpentering from his Uncle John. The trade thus acquired provided a means of gaining the education which formed a groundwork for subsequent advancement. But that wasn't all. A man who adopted Uncle John Creveling's methods of doing things right (and if he worked under Uncle John he either had to do that or quit) was bound to carry the same habits of thoroughness and proficiency along with him into other vocations.

On second thought, maybe Mr. Creveling's regard for his uncle isn't so insurrectionary. Perhaps it just shows a nice sense of values.

BILL TO MAKE PIPE LINE COMPANIES PUBLIC UTILITIES PRESSED IN TEXAS

AUSTIN, Tex., Mar. 4.—The pipe line control bill sponsored by the Independent Petroleum Association of Texas was favorably reported to the senate this morning. The same bill was awaiting final committee hearing and report in the house late tonight. Ruling of Attorney General Robert Lee Bobbitt upholding its constitutionality was delivered to the legislative committee today. President Tom E. Cranfill of the Independent association predicted passage of the bill in the remaining 10 days of session and it was said Governor Moody's submission of the subject forecast its approval by him.

At the first house committee hearing Tuesday morning, Gen. Jacob F. Wolters, discussing the bill, expressed belief it might adversely affect the independents who are asking it.

The independent operators in a meeting here last week charged that the pipe lines discriminated against them. As a result, the legislature and governor, were informed, independents are facing a serious market and financial situation.

The bill would give arbitrary power to the State Railroad Commission of Texas to force the extension of pipe lines; to build additional storage; to issue negotiable run tickets; to require the publication each month of the receipts, deliveries, stocks and available storage room, and the amount of oil run from each lease by all common carriers in Texas.

Text of Pipe Line Bill

The text of the pipe line bill presented to Governor Moody is summarized as follows:

Section 1. Every person, association of persons, or corporation, owning, operating or managing any crude petroleum storage tanks or facilities for the public for hire, either in connection with a pipe line, pipe lines, or otherwise, is hereby declared to be a public utility.

Section 2. No such public utility in its operations as such shall discriminate

(Continued on Page 250)

Development of Foreign Refineries

Past 12 Months More Fruitful in Expansion Abroad Than Any Previous Period. Numerous Projects Under Consideration

By Charles E. Kern
Washington Bureau, The Oil and Gas Journal

WASHINGTON, D. C., Mar. 1.—The establishment of refineries in many parts of the world and the growth in facilities of these refineries from year to year constitutes a notable development that has been prominent in the oil industry during the past several years. The 12 months of 1929 were perhaps more fruitful in additions to refinery facilities throughout the world outside of the United States than any previous period.

The petroleum section of the Minerals Division, Department of Commerce, has distributed questionnaires for the purpose of a review of the oil refining industry of the world outside of the United States and when that publication is completed it will be possible to definitely determine world conditions for the refining of petroleum.

Within three months an Italian oil refinery was inaugurated near Spezia, Italy. It was built in accordance with an agreement made in 1928 between the Italian company and the ministers of national economy and finance whereby the state shares in the profits of the company. This enterprise contemplates the construction of 38 oil tanks and the first cargo of 6,000 tons of cheap Rumanian residual oil was delivered in anticipation of this enterprise last summer. These 38 tanks are said to have a total capacity of 42,000,000 liters. The refinery buildings are surrounded by a wall outside of which is a cultivated area constituting the protective zone of the refinery. The working capacity of this Italian refinery is stated to be about 72,000 tons of Rumanian residual crude.

The Imperial Oil, Ltd., is now carrying out a project of considerable importance in the extension of its refinery at Imperoyal across the harbor from Halifax, Nova Scotia. The company is employing at this time 600 men in enlarging and improving its refinery, this work requiring eight months and the cost of the project is estimated at $750,000 by the superintendent, D. E. Allen. A cracking process is being installed as part of this development. The company is now preparing to manufacture road oils and asphalt to be used in the Maritime Provinces. A hot lye-treating unit is also being installed to improve the quality of the gasoline used in the Maritime Provinces.

To Build at Barcelona

Information has recently been received here from Madrid, Spain, to the effect that the Spanish Petroleum Monoply offers competitive bidding to Spanish and foreign individuals for the construction and installation in Barcelona of a petroleum refinery with an initial capacity of 700 tons of petroleum which may be increased to 1,500 tons. The general scheme to govern these competitive bidders will be on display in Madrid until April 21 of this year and on that date the competitors are to submit their bids. Anyone who wishes to receive these plans for the competitive bidding may do so by sending 25 pesetas to the Compania Arrendataria del Monopolio de Petroleos, S. A., Terija 9, Madrid, Spain.

A petroleum refinery was placed in operation about 40 miles southeast of Stockholm, Sweden, by A. Johnson & Co., owners and operators of the Johnson line to the West Coast of the United States via the Panama Canal. The source of the crude supply for this refinery is the Mexican Gulf district and 100 tons of crude per day are consumed. The chief products manufactured are gasoline, kerosene, fuel oil and asphalt. The high pressure cracking process is used and the equipment is standard.

There is no petroleum refining being done in China other than the distillation of oil from shale deposits which is being conducted by the South Manchuria Co., in connection with its Fushan mines in Fengtien Province. It is stated that the Fushan experts after various experiments with systems abroad have invented a new process for producing oil from shale which has proved highly successful. Shale deposits are estimated at about 5,500,000,000 tons. Plans have been made for a plant capable of handling 1,360,000 tons of shale a year from which it is expected will be produced 70,000 tons of crude oil as well as paraffin and ammonia.

According to reports which have appeared during the past quarter it seems that the Estonian oil shale industry expects that increased interest will be displayed in the development of Estonia's oil shale deposits in the coming months. This, it is stated, will take the form of large new investments of foreign capital in the oil shale industry, and of the building of a gasoline cracking plant by the state oil shale industry

With respect to the first ot the two points just mentioned, reports have appeared to the effect that a large English concern has recently secured a concession from the Estonian government which gives it the right to carry on oil shale research work over a territory of 35,000 hectares of land located near Johvi, Estonia. It is believed in local circles that this firm intends to erect an oil shale plant at the above place in the near future.

Toward the end of 1929 the Estonian government gave its consent to the building by the state oil shale industry of a gasoline plant at Kohtla at which shale oil will be used as a raw material. It is estimated that the cost of the new factory will be about $96,000. The equipment of the new plant is to be supplied by Neckmann, a Berlin concern, with which negotiations have been in progress for some time. According to the present plans the daily output of the new gasoline plant will be about 15 tons, which will be enough to cover about 60 per cent of the local demand for gasoline. The management of the State Oil Shale Industry hopes to be able to market the output of the new gasoline plant at $0.064 per liter. The present price for gasoline in Estonia is about $0.09 per liter.

Refining in France

During the past year there has been great activity in France for the establishment of a petroleum refining industry. Some of the more important companies have been contemplating or preparing for the construction of plants at Marseille, Rouen, Havre, and Bordeaux. It is expected there will be developments of this kind in the southern part of France to take care of the shipments of crude oil coming from the state concessions of Mesopotamia. The entire petroleum industry, both as regards imports and refining, is placed under the close control of the state through the import authorizations of March 30, 1929, and through the establishment of the Compagnie Francaise des Petroles and the Compagnie Francaise de Raffinage which are to distribute and to refine respectively the total volume of petroleum imported from Mosul.

The Compagnie des Produits Chimiques et Raffineries de Berre, having obtained the import authorization, is at present building an important refining plant for the treatment of 400,000 tons of petroleum annually. It has acquired the processes of refining and hydrogenation now used in Germany by the Kohlenveredling, a branch of the Allgemeine Elektrizitaets Gesellschaft.

The Compagnie des Raffineries de Petrole du Nord is contemplating the construction of additional facilities at St.-Pol-sur-Mer, in the north of France. This plant will treat in the first period of its activity 350,000 tons of crude petroleum, and, in the second period, 500,000 tons. Moreover, the stockage of crude products in the amount of 125,000 cubic meters is contemplated for the second period. Finally, warehouse for stockage of 200,000 cubic meters of finished or half-manufactured products is contemplated. It is said that work has been begun on this refinery.

At a special meeting held on December 31, 1929, it was decided to authorize an increase in the capital of the "Produits Chimiques et Raffineries de Berre" from 110,000,000 to 400,000,000. The majority of the stock of this important company is held by the Saint Gobain Co. It is believed that for the present the capital will be actually increased by 55,000,000 and that the intention of the board of directors is not to make further capital increases before 1931 or 1932.

Most Important in Europe

Twelve months after the passage by the French parliament of the law relative to the revision of the customs tariff levied on petroleum products in 1928 a refinery was completed at the entrance to the port of Rouen. This refinery is now said to be the most important petroleum refinery in Europe.

Approximately 600 tons of petroleum will be handled daily and it is hoped that in the very near future this will be increased to 1,200 tons. As soon as the more important petroleum importing companies were informed of the passage of the law they designated Rouen as the most favorable center for the building of a modern petroleum refinery. Rouen is the foremost French port for the importation of petroleum and its derivatives. Its facilities for the unloading, storage and reshipment of petroleum products are unique.

The new law favors the importation of petroleum and it is estimated that 10 petroleum refineries will be necessary in France to handle the imports of raw petroleum.

The downstream limit of the port of Rouen is fixed at exactly 10 kilometers beyond the city limits proper on the same level as Petit-Couronne on the left bank of the Seine as far as Val-de-la-Haye on the right bank. Beyond the ship repairing docks which are situated on the left bank of the Seine just before arriving at Petit-Couronne there is located a large raw petroleum receiving station capable of docking two tankers of 490 feet at the same time. It is just at this point that the Societe Maritime des Petroles has built the refinery referred to. The refinery is now in operation.

New Refinery Described

Several years ago on the same site the land was entirely agricultural but today the land is dotted here and there with mills and factories on each side of the river. Along the River Seine at this place, quays, landing stations and docks have now been built to take care of the ever-growing trade in petroleum and its by-products. The landing and receiving station of the new refinery are constructed of reinforced concrete and are so equipped that coal vessels and oil tankers can be unloaded simultaneously. The refinery will import its coal direct and take charge of the unloading of the cargo. Therefore the traffic of the port of Rouen will not only be enhanced by further importations of raw petroleum but also by the increased imports of

(Continued on Page 208)

GUIDES TO EXPLAIN EXHIBITS AT OIL EXPOSITION IN LOS ANGELES

LOS ANGELES, Calif., Mar. 3.—The program of the Los Angeles Oil Equipment and Engineering Exposition, which will open at noon on Sunday, March 16, is taking shape. Exhibits are expected to be in place then, but the formal opening exercises will take place at 10 a.m. Monday. Governor C. C. Young is scheduled to take part in the ceremonies, along with civic and business leaders.

On Monday afternoon, the first of a series of personally conducted tours of the exposition will be made by students of the University of Southern California, under the direction of Prof. John Franklin Dodge.

Each morning and afternoon during the exposition week, similar groups of visitors will be taken around the exposition by experienced guides. Visitors will be asked to register for these groups so that a sufficient number of guides can be provided to insure clear explanation of the design, construction and purpose of the various exhibits. The information given by the guides will supplement that given by the exhibitors themselves. Consulting engineers and field men have volunteered to act as leaders for other groups of visitors.

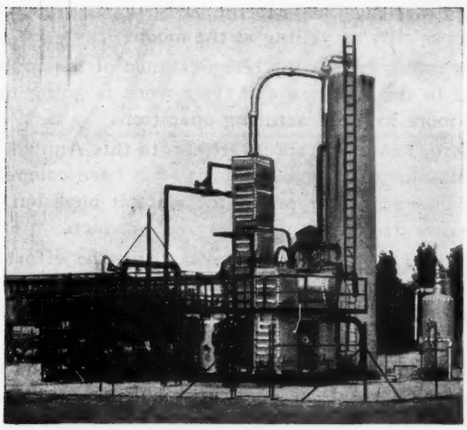
Among groups of visiting engineers will be those led by professors at the leading California universities, including Professor Clapp, of California Institute of Technology; Prof. J. F. Dodge, of the University of Southern California; Prof. E. K. Soper, of the University of California, Los Angeles; Professor Tickel, of Leland Stanford, Jr., University, and Prof. Lester C. Uren, of the University of California, Berkeley.

On Tuesday afternoon groups from the American Society of Steel Treaters and the American Welding ociety will visit the exposition. In the evening a joint session of these societies will discuss three papers: "Noncorrosive Metals in the Oil Industry, with Special Reference to Stainless Steel and Nicralloy," "Alloy Steel in Oil Field Equipment," and "Heat Treating Methods."

On Wednesday afternoon a meeting sponsored by the American Institute of Mining and Metallurgical Engineers will discuss oil field problems. Robert W. Phelps, petroleum engineer, will speak on "Production Data to Establish Variols Theories on Well Spacing." Mr. Phelps' paper will be illustrated by charts and specially prepared models showing the effect of well spacing on the output of individual wells and also on field production. H. W. Rose will contribute a paper on "The Original Eotvos and Eotvos-Rybar Torsion Balances, and Their Use."

On Wednesday evening the American Society of Mechanical Engineers will hold a meeting at which J. Z. Welsh and T. S. Tulien, of the oil equipment division of the Johns-Manville Co., will speak on the mining and manufacture of asbestos for use in the oil industry.

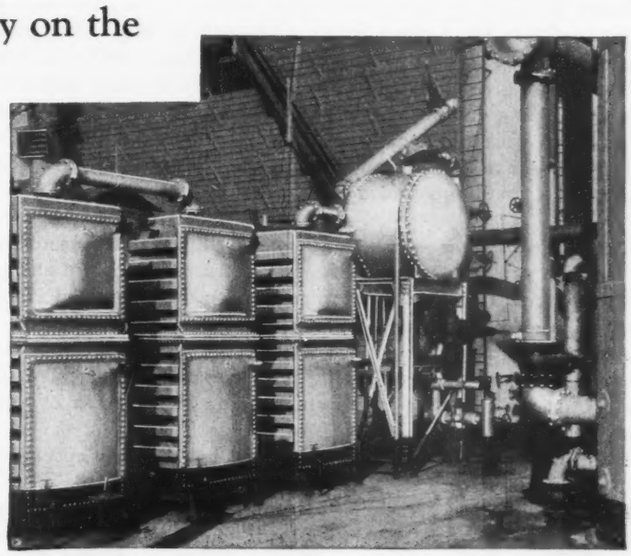
Thursday and Friday will be given over to the A.P.I. conference on drilling and production procedure.



BUILT for a Definite Service by SOUTHWESTERN

A HIGHER heat transfer rate for a given pressure drop than any other type of apparatus is the performance record of Southwestern Heat Exchangers—either in the refinery, gasoline absorption plant or natural gas plant due to principles of design and construction.

Operating economics depend largely on the efficiency of the equipment used. For that reason Southwestern Heat Exchangers should be specified in constructive programs for lower operating costs.



A REAL ACHIEVEMENT IN HEAT TRANSFER EQUIPMENT

Write or Wire Our Nearest Office

SOUTHWESTERN ENGINEERING CORPORATION

606 SOUTH HILL STREET
LOS ANGELES, CALIFORNIA

NEW YORK, N. Y., 117 Liberty St.
TULSA, OKLA., Mayo Bldg.

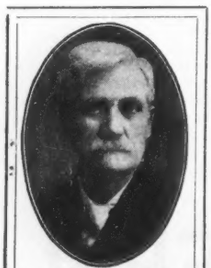
132 St. James St., MONTREAL
350 Bay Street, TORONTO

CONDENSERS
HEAT EXCHANGERS
OIL AND GAS COOLERS
ABSORPTION TOWERS
ABSORPTION PLANTS
RECTIFYING PLANTS
WATER TUBE BOILERS
TUBE STILLS

The OIL and GAS JOURNAL

PRODUCING REFINING ENGINEERING MARKETING

Published Weekly by
THE PETROLEUM PUBLISHING COMPANY
114-116 West Second Street
TULSA, OKLA.



Established as an International Publication in 1910 by Patrick C. Boyle.

President - - - - - - - - - - - Frank T. Lauinger
General Manager - - - - - - - - - John M. Egan
Editor - - - - - - - - - - - - James McIntyre
Managing Editor - - - - - - - - Andrew M. Rowley
Refinery Editor - - - - - - - - - C. O. Willson
Technical Editor - - - - - Charles K. Francis, Ph.D.
Petroleum Engineering Editor - - - - L. G. E. Bignell
Associate Editor - - - - - - - - W. T. Anderson
Associate Editor - - - - - - - - W. T. Ziegenhain
Associate Editor - - - - - - - - Thomas F. Smiley
Advertising Manager - - - - - - - E. Klappenbach
Circulation Manager - - - - - - - J. P. Mulkern

DISTRICT ADVERTISING OFFICES

C. L. CAIN - - - - - 101 Park Ave., NEW YORK CITY
L. AUSTIN DE VORE - - - - - - - - - - - - - -
- - Room 1416—6 North Michigan, Ave., CHICAGO, ILL.
ALVIN E. LOEFFLER, State Theater Bldg., PITTSBURGH, PA.
C. R. JOHNSON - - - - - - - - - - - - - - - -
- - 730 Petroleum Securities Bldg., LOS ANGELES, CALIF.
C. R. FARMER - - - - - - - - - - - - - - - - -
- - - 1316 Second National Bank Bldg., HOUSTON TEX.

TERMS OF SUBSCRIPTION
(By Mail, Postage Prepaid)

Single copies - - - - - - - -	$ .15	One year (in United States) - - -	$6.00
Three months - - - - - - - -	$2.00	One year (in Canada) - - - - - -	$7.00
Six months - - - - - - - - -	$3.00	One year (foreign countries) - - -	$7.06

ADVERTISING RATES ON APPLICATION
Telephones: 6291-6292-6293

Remittances by Checks, Drafts, Express or Postal Money Orders should be made payable to
The Petroleum Publishing Company
Cable address, "Oilgasnal"

MEMBER AUDIT BUREAU OF CIRCULATIONS

NEW DIVISION NEEDED

The recent reorganization of the American Petroleum Institute, establishing divisions of production, refining and marketing, might well have been extended to include a division of utilization to develop outlets for new products.

In this issue of The Oil and Gas Journal we present the Annual Refinery Number, including a detailed survey of the petroleum refining branch in the United States. Outstanding in this year's survey, as in the past, is the remarkable progress along technical lines.

The refining division has made some gains in total number of operating plants and also in rated capacity for refining crude oil, but of much greater importance is the growth of facilities for securing gasoline and other products by cracking residual oils which only a few years ago obtained their value from their utilization as fuel.

The practical engineer and operator, working hand in hand with the research department, has constantly increased the yield and improved the quality of the most important product obtained from a barrel of crude oil.

Along with this expansion in cracking facilities has come a tremendous progress in the operating processes and equipment of the manufacturer in securing larger yields and a better grade of lubricating oils.

In brief, the refining industry has become a highly specialized industry comparable to the major industries of the world.

Nevertheless it is occasionally contended that too much stress is being applied to the development of manufacturing processes, that supply stimulated by research has outrun demand, and that the industry would be better off if it had been satisfied with the old practices.

This thought, of course, is totally opposed to any progress and would be absurd, as well as impossible, if attempted in practice.

The historic parallel is King Canute's followers asking him to halt the ocean's tide.

It is unquestionable that research, by enlarging yields, has contributed to lowering prices to the consumer to the point where there has been little or no profit left to the manufacturer, but this is no reason why research should not be continued.

It is inevitable that the research necessary to progress must continue and the quicker the industry adjusts itself to this situation the better it will be for all concerned.

This is an industrial age in which living standards have been raised largely because means have been developed to get more of a given quantity of products out of the raw material and so bring them within the reach of all.

Economists agree that this has been the basis of our prosperity. To complain of it is as silly as yelling at the moon.

Some of the best brains among the technical men of the country have been attracted to the industry and their work is going to be reflected more and more in manufacturing operations.

One of the numerous contributors of articles to this Annual Refinery Number points out that the oil industry has been compelled to pay 50 per cent above pre-war prices for what it buys but has been unable to increase its returns upon its own products.

It was this condition that stimulated research in the effort for more efficient and economical operation, attained by improved methods and apparatus, less expensive processes and the reduction of losses.

But, he says, there are signs that we are approaching the economic limit in increasing yields of our principal products beyond demand.

This, however, does not mean that we are at the limit of research. It does indicate that we should give more attention to research along the line of seeking new and proportionately more valuable products and new or enlarged markets.

In regard to our present markets the Annual Refinery Number of two years ago suggested that more effort be made to increase consumption of motor fuel and motor oil.

This suggestion actively put into effect by many companies throughout the country had very tangible results. These companies have indisputable data showing that the efforts made to secure larger use of automobiles and other motor vehicles through picturing to the public the pleasures of motoring during summer evenings and week-ends were reflected in sales at the filling stations.

The exceptionally large increase in the average consumption of gasoline per car in 1929 attests to the fact that people can be induced to increase their consumption of gasoline and motor oil.

Last year $450,000,000 was collected by the States in gasoline taxes, exceeding for the first time the revenue obtained from the registration of motor vehicles.

This year the gasoline taxes will total $600,000,000. This immense sum will be spent largely on the construction and maintenance of improved highways, supplemented by funds from other sources.

This tremendous toll, while aimed at the oil industry which has been put to the labor and cost of collecting it for the States, has of course been levied really upon the motoring public which seldom appreciates the cheapness of gasoline without the tax.

Since the gasoline tax is here and continually being increased the oil industry should assist the people in getting the fullest pleasure and profit out of their investment of billions of dollars in these improved highways.

The general dissemination of information about available roads, interesting and attractive places to go and tours to be taken, should be a permanent part of the industry's marketing policy.

The increasing use of gasoline, while most important, is, however, only one phase of the possibilities to enlarge consumption of old and new products.

As a result of the widespread research by theoretical and practical engineers now under way, both within and outside the industry, more and more products from crude oil and its derivatives have been found for use in connection with commodities of general use.

Some of the new products are not of any commercial value at present because there has been no effort to develop markets for them. Surely an industry which willingly spends hundreds of millions yearly on new manufacturing equipment or repairing old equipment should be willing to give time and money for the development of new markets which in many cases would be more profitable in proportion than the markets on which it is now dependent.

Those who have investigated the situation agree, for example, that the market for asphalt in road construction could be increased

(Continued on Page 64)

Another Great Achievement

DRESSER

COUPLINGS·DOMINATE

Outline Advantages of Germ Process

Small Percentages of Fatty Acid in Mineral Lubricating Oils Greatly Reduces Coefficient of Friction

By Bert H. Lincoln*

When metallic or other surfaces in contact are caused to slide over each other, considerable frictional resistance to motion results and the surfaces abrade each other. In all moving machinery there are numerous rubbing surfaces and the materials in contact must slide over each other with as little frictional resistance and as little wear as possible. Experience has taught us that the frictional resistance and abrasion may be reduced by the use of lubricants.

Only a few liquids act as efficient lubricants. The reason one liquid should be a good lubricant and another not has attracted a good deal of notice by physicists, chemists and engineers. Attention was first directed to viscosity, for it was found that the viscosity of the fluid was a very important consideration in lubrication problems. The exact part played by viscosity was made apparent by the classical "friction experiments" made by Beauchamp Tower[1] and the mathematical consideration of his results by Osborne Reynolds.[2] For the operating conditions these workers established the fact that when an oil was applied to two surfaces in contact which were in relative motion and certain conditions as to speed, load, and mechanical construction were fulfilled, an oil film existed between the surfaces and entirely separated them. Under these conditions the friction was proportional to the mean thickness of the oil film, the rate of shear and the viscosity of the oil, the viscosity of the oil being the major factor.

As early as 1898 it was well known from the experiences of practicing engineers that, although the results obtained by Tower in his experiment with perfectly lubricated journals and proved by Reynolds to be due to the viscosity of the oil, there was some other important factor involved in practical lubrication. When the supply of oil was insufficient or the conditions of load, speed, etc. were unfavorable to the formation of the liquid film (in other words when the oily solid surfaces came into close contact and rubbed against each other), lubrication depended upon some property of the lubricant other than viscosity and in default of a better word the term "oiliness"[3] was used to designate this property.

Use of Castor Oil on Friction

The general experience of engineers has been confirmed by F. W. Lanchester[4] who states as his experience in testing of gas engines that, if a bearing ran hot when on test with a mineral oil lubricant, the substitution of castor oil for the mineral oil could be depended upon to remove the trouble. Lanchester also found, in experimenting with his worm dynamometer, that the lubricating properties of an oil for worm gear—in which very high pressures are developed and in which there is much solid friction—depended more upon the nature of the oil than its viscosity; in fact, two oils of the same viscosity often gave entirely different frictional readings owing to the superior "oiliness" of one oil over the other.

These observations have been confirmed and extended by experiments made at the National Physical Laboratory with the Lanchester machine[5] in which a series of mineral oils of widely different viscosities were compared with rape, trotter, sperm and castor oils. All the mineral oils tested gave higher frictional resistances than the animal and vegetable oils and showed a tendency to lose their lubricating value when the temperature rose above a certain figure. No such tendency was shown when the animal and vegetable oils were used as lubricants. The particular interest of these experiments lies in the remarkable difference in behavior between the mineral oils and the fatty oils, and the absence of any clear connection between the lubricating value and the viscosity of the oils tested. At the pressures used in these tests, the viscosity of castor oil was about six times as great as that of the trotter oil at the same temperature, and yet the frictional resistances were very nearly the same.

The reduction of friction must, therefore, have been due to some property of the lubricating oil other than viscosity and the results confirm the view that this property is possessed in greater degree by animal and vegetable oils than by mineral oils. Thus the animal and vegetable oils must contain some substance or substances that give this so-called "oiliness" in amounts greater than found in the mineral oils. Theoretical and practical developments have not proved Tower and Reynolds' conclusions false, but they have shown that there is a very important set of conditions existing in practice not contemplated in their work.

TABLE NO. 1

Oil used—	Viscosity at 60° F. seconds Redwood	Sp. gr. at 60° F.	Total acidity calculated as oleic acid	Mean temp. of expts.	Peripheral speed in feet per minute	Arc.	Coefficient of friction
A—Pure mineral oil	973	0.909	Nil	62	11	40	0.0084
B—97% pure mineral oil							
1% pale cyl. stock*							
2% com. fatty acid	973	0.909	1.9%	62	11	25	0.0052
C—80% mineral oil							
20% olive oil	980	0.908	0.3%	63	11	40	0.0084
D—40% mineral oil							
60% olive oil	970	0.907	0.9%	64	11	35	0.0073

*Added to keep the viscosity constant.

TABLE NO. 2—PENNSYLVANIA LLUBRICATING OIL*
Oil Spread on Both Surfaces in an Appreciably Thick Pool.

Load grams†	Latent period	Mean angle of slip deg.	Max. variation from mean per cent	No. of detns.	Mean coefficient of friction
200	1 to 20 min.	8.4	9.5	8	0.149
500	0	10.0	0.0	3	0.176
800	0	10.4	11.5	9	0.182
2,000	0	10.3	6.8	6	0.182
3,800	0 to 1 hr.	9.8	5.1	8	0.173
Surfaces Reground Same as Start Above—No Lubricant.					
200	0	37.8	12.7	8	0.776
Crude Oil Spread on Both Surfaces.‡					
200	0	10.7	30.0	9	0.188
Oleic Acid Rubbed Into Crude Oil Film.					
200	0	7.3	12.3	8	0.128
3,000	0	6.8	10.3	3	0.119

*Paraffin base oil from Franklin, Pa.—specific gravity at 15° C. 0.879; Saybolt viscosity at 100° F. 693 seconds and at 130° F. 354 seconds.
†The actual weight of the slider is given, as the exact area of contact is unknown.
‡Same crude from which the oil used in first series was refined. Specific gravity at 15° C. 0.868; viscosity at 100° F. 108 seconds and at 130° F. 71 seconds.

Explains Oiliness

Two entirely different conditions must be considered in connection with the problem of lubrication: (1), the condition in which the solid surfaces covered by an adsorbed film come into close contact and rub against each other and (2), the condition in which the solid surfaces become completely separated by a film of liquid oil which forces itself between them. In the first condition, which may be termed "solid film" or "boundary lubrication," the efficiency depends upon the oiliness of the lubricant and the unctuousness of the solid—not upon the viscosity. In the second condition, which may be termed "liquid film" or "viscous lubrication," the friction depends almost wholly upon the viscosity of the oil and is the condition considered by Tower and Reynolds.

Although a great deal of information can be obtained in the testing of lubricants by determinations of viscosity, gravity, volatility, flashpoint, firepoint, cold test, etc., and by chemical tests, none of these tests measures the degree of oiliness which a lubricant possesses—upon which its value as a means of reducing friction at low speeds, high pressures, and scarcity of oil (from any cause) so greatly depends. This property can be measured only by a friction testing machine. The frictional resistance of a bearing is also due to what may be termed the unctuous nature of its surfaces, for each metal tested for slipperiness against itself—without any lubricant—gives a distinctive coefficient of static or boundary friction. The value of this coefficient can be obtained only by experiment with a mechanical testing machine.

In using friction testing machines it was found that every change of speed, load, method of lubrication, temperature, form of bearing and especially the nature of the rubbing surfaces has some, frequently a considerable, effect on the frictional resistance obtained with each lubricant. These variable factors have contributed to the development of a rather large number of friction testing machines. It is interesting to recall in this connection that the static coefficient of friction may be as high as 0.9 and the value of the kinetic coefficient as low as 0.00075.

The coefficient of friction may be defined as that value which, when multiplied by the pressure normal to the surfaces in contact, gives the measure of the frictional resistance to motion. For example, suppose we have a loaded box or slider resting on a horizontal slide. A cord is fastened to the slider, passed over a pulley and carries a small suspended box which may be loaded with any desired weight. By placing weights in the suspended box (the slider being loaded) force is applied in a direction parallel to the sliding surfaces, and when the slider begins to move the weight of the small box and its contents are a measure of the frictional resistance. If the weight of the slider is 2,240 pounds and a force of 350 pounds is required to cause it to move, then:

$$\frac{350}{2240} = 0.156 = \mu \text{ or } \mu_1$$

which is called the coefficient of friction. 350 = F which is known as the frictional resistance, μ being the static and μ_1 the kinetic coefficient of friction. It has been found that the force F required to keep a body in motion differs from that required to move it from a state of rest. From the force required to put the body in motion we can obtain the static coefficient of friction, and from the force required to keep the body in motion we can obtain the kinetic coefficient of friction.

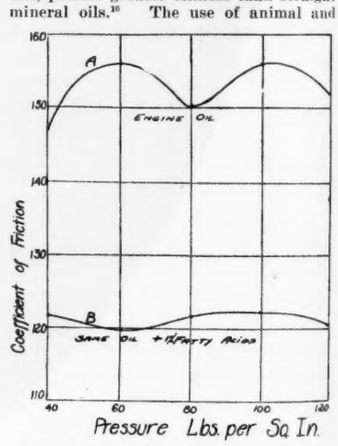
Testing Machines Used

A few of the most useful types of machines which have been designed for ordinary testing work and the most important of those which have been used for experimental research work are listed below with the reference to the literature from which detailed descriptions may be found:

1. Deeley's adsorbed film-testing machine.[5]
2. Hardy's apparatus and method.[6]
3. Stanton's pendulum machine.[7]
4. Lanchester worm-gear testing machine.[5-8]
5. Kingsbury's oil-testing machine.[9]
6. Thurston's testing machine—manufactured by W. H. Bailey & Co., Manchested, England.
7. Beauchamp Tower's machine also Towers disc and collar machine.[10-3]
8. Goodman's friction testing machine.[11]
9. Stanton's oil testing machine.[12]
10. Benjamin's machine.[13]
11. Friction of screws.[14]
12.—R. C. Wilharm—measurement of oiliness.[15]

"It is common knowledge that all amimal and vegetable oils, or mixtures of mineral oils and animal and vegetable oils, possess greater oiliness than straight mineral oils.[16] The use of animal and vegetable oils to obtain oiliness is found not practical from a commercial standpoint. The price of these oils blended

(Continued on Page 236)



Graph showing effect of adding 1 per cent fatty acid to a mineral oil.

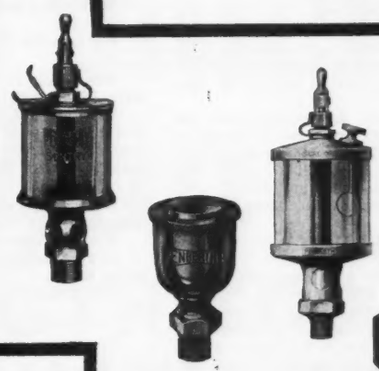
*Assistant to the manufacturing manager of Continental Oil Co.

[1]Proc. Inst. Mech. Eng. 1883 p. 632; 1884 p. 29; 1885 p. 58; 1888 p. 173; 1891 p. 111.
[2]Phil. Trans. 1886 p. 157.
[3]C. Y. Boyles—Phys. Soc. 1908; J. Inst. Pet. Tech. (1918) 4.219; J. of Soc. of Chem. Ind. (1920) pp 51-60.
[4]"Discussion on Lubrication," Proc. Phys. Soc. London 32 (1919).
[5]Report of the Lubricants and Lubrication Inquiry Committee—1920.
[6]Phil. Mag. 38 (1919 32; Phil. Mag. 38 (1919) 49; Phil. Mag. 40 (1920) 201; Roy. Soc. Proc. A, 100 (1922) 550; Roy. Soc. Proc. A, 101 (1922) 487; Roy. Soc. Proc. A, 104 (1923) 25.
[7]"The Nature of Lubrication in Engineering Practice" report International Air Congress, London, 1923. See also the Engineer CXXXV 1923—678.
[8]Proc. Institute Automobile Eng. 7 (1913) 242.
[9]Trans. Amer. Soc. Mech. Eng. XXIV (1903) 143.
[10]Proc. Inst. Mech. Eng. 1883 pp 632-652.
[11]Phil. Trans. (1886) 165; also Eng. Patent 22,295 to Goodman.
[12]Journal Inst. Mech. Eng. (1922) 1117-1145; also Harrison Trans. Cambridge Phil. Soc. XXII (1913).
[13]F. H. Sibley—Amer. Soc. Mech. Eng. (1909).
[14]Trans. Amer. Soc. Mech. Eng. XVII (1896) 96.
[15]J. Ind. & Eng. Chem. May 1926 pages 463 to 467.
[16]T. C. Thompson (for many years chief engineer to the Vacuum Oil Co.) "The Practice of Lubrication," page 67—McGraw Hill Book Co.

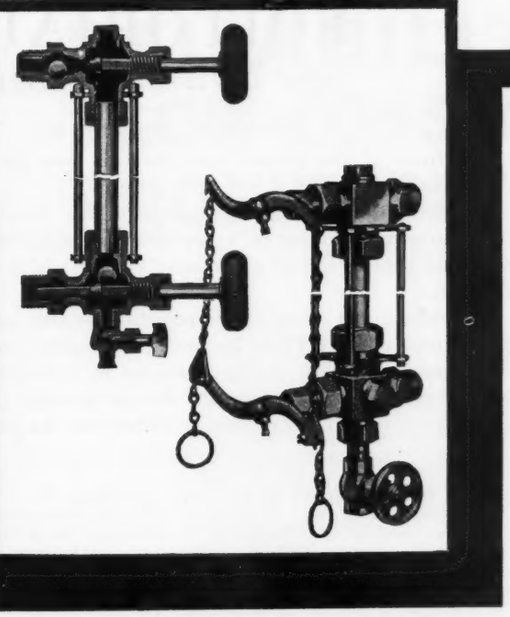
ALWAYS DEPENDABLE

PENBERTHY injectors, liquid level gages, and lubricating devices are universally used in field, refinery and natural gasoline plant because they have always been dependable under the most severe service conditions.

Penberthy Products are carried in stock by supply houses everywhere.



PENBERTHY PRODUCTS



PENBERTHY INJECTOR COMPANY
DETROIT
ESTABLISHED IN 1886
CANADIAN PLANT, WINDSOR, ONT.

Late Fields

GULF COAST

HOUSTON, Tex., Mar. 4.—Flank sand production at Spindletop on the south side of the dome was extended approximately 800 feet to the northeast Tuesday with Yount Lee Oil Co.'s No. 125 McFaddin, which is estimated good for approximately 1,400 bbls. of oil from a sand around 2,800 feet. The hole has been plugged back from 3,200 feet after drilling into salt. Houston Oil Co.'s No. 1 Carlysle, Block 33, Refugio, was completed flowing 200 bbls. of pipe line oil from sand at 3,695-3,717 feet. Humble Oil & Refining Co.'s No. 1 Cook, Boggy Creek, Anderson County, was completed flowing 500 bbls. of oil at 3,694 feet.

KANSAS

Smith and Ash's No. 1 Tripp, NW cor. SE, Section 22-26-2, Sedgwick County, Kansas, found the Simpson sand at 3,303-06 feet, where the oil rose 600 feet in 15 minutes together with a puff of gas which became ignited and destroyed the rig and drilling equipment. The well extends production in the Greenwich district a half mile south. It will probably be a week before operations at the well can be resumed.

New potentials were taken in the Voshell Pool, in McPherson County, over the weekend, 9 wells of the 11 completed wells, made 12,852 bbls. Two of the wells were off production. The largest well in the pool two weeks ago was the Derby Oil & Refining Corp.'s No. 1 Stuckey, NE cor. SE, Section 9-21-3w, which made 2,181 bbls. On Monday, March 3, it made 1,616 bbls. The following is the production of each well:

Company, lease—	Well No.	Bbls.
Derby, Stuckey	1	1,616
Derby, Stuckey	2	1,461
Empire, Voshell	1	1,535
Empire, Voshell	2	1,780
McBride, Voshell	2	1,250
Mid-Kansas, Voshell	1	1,600
Prairie, Stuckey	1	none
Sinclair, Voshell	1	820
Sinclair, Voshell	2	1,240
Shell, Stuckey	1	none
Texas, Stuckey	1	1,550
Total	11	11,852

Shell Petroleum Corp.'s No. 1 Stuckey, NE cor. SE SE, Section 9-21-3w, swabbed 358 bbls. in seven hours from the Simpson sand at 3,363-66 feet. The well was later reported making 40 bbls. an hour.

McPherson Oil & Gas Co. and the Shell Petroleum Corp.'s No. 1 Koehn, C SE, Section 12-20-2w, McPherson County, in the Ritz Pool, filled up 500 feet with oil from the chat at 2,930-70 feet. A production test will be made.

OKLAHOMA

Two new wells were completed in the Oklahoma City Pool, March 4, and both were making water. Indian Territory Illuminating Oil Co.'s No. 3 Bodine-Anderson, SW cor. NE NW, Section 30-11-2w, a quarter mile southeast from the discovery well in the pool, was plugged back from a total depth of 6,648 feet, to 6,435 feet. The well made 387 bbls. of oil, of which 2 per cent was water, in 14 hours from the Silicious lime. The other well was the same company's No. 1 A. Brokaw, NW cor. NE NE, Section 13-11-3w. It blew in making 1,045 bbls. of oil, of which 1 per cent was water, in 12 hours. The well is producing from the Silicious lime at 6,153 feet to a total depth of 6,437 feet.

The Oklahoma City Pool has 128 completed wells, of which eight are gas wells and 120 oil wells. Twenty-four wells were open on March 4 and made a total of 62,206 bbls.

Tom Slick Oil Co.'s No. 1 Hoopes, NW cor. SW NE, Section 13-11-2w, the most southerly test in the pool to show oil, was drilling the cement plugs at a total depth of 6,424 feet. The well has a showing of oil in the Simpson sand.

Indian Territory Illuminating Oil Co.'s No. 1 Unsell-Krager, NE cor., Section 23-11-3w, on the west side of the pool, has drilled the cement plugs and was bailing the mud. The total depth of the test was 6,491 feet in Simpson sand.

On the north side of the field Wirt Franklin Petroleum Corp.'s No. 7 Lowery, NE cor. SE NW, Section 12-11-3w, cored a sand at 6,337-52 feet, with showing of oil.

The wildcat test of J. F. Cunniff and others' No. 1, in Section 17-12-4w, has the Pawhuska formation at 4,040 feet and was drilling at 4,130 feet.

(Continued on Page 252)

THE OIL MAN'S CALENDAR

March 10-12 — Shreveport, La., Convention, Western Petroleum Refiners Association.

March 11-12 — Philadelphia, Semiannual Convention, Pennsylvanian Oil Men's Association, Elks Hotel.

March 12-14—Enid, Okla., Farm Machinery and Tractor Show.

March 14-15 — Chattanooga, Tenn., Triannual Meeting, Tennessee Oil Men's Association, Patten Hotel.

March 16-23—Los Angeles, Oil Equipment and Engineering Exposition, Shrine Auditorium.

March 17-18—Chicago, Spring Meeting, Independent Oil Men of America.

March 19 — Detroit, Regional Meeting, American Society for Testing Materials, Book-Cadillac Hotel.

March 19-21—Detroit, Convention, Michigan Oil Men's Association, Statler Hotel.

March 20-22—New Orleans, La., American Association of Petroleum Geologists, Roosevelt Hotel.

April 5-9—New York, Hoboken, N. J., and Washington, D. C., Fiftieth Anniversary Celebration, American Society of Mechanical Engineers.

April 7—Pittsburgh, Pa., Meeting and Election, Eastern District, Division of Production, American Petroleum Institute, William Penn Hotel.

April 5-13—Detroit, All American Aircraft Show.

April 7-11—Atlanta, Ga., Seventy-ninth Meeting, American Chemical Society.

April 7-12 — Chicago, Annual Meeting, American Oil Burner Association, Stevens Hotel.

April 15-17—Norman, Okla., Gas Measurement Short Course, Universysity of Oklahoma College of Engineering.

April 24-25 — Cleveland, Ohio, Semiannual Meeting, National Petroleum Association.

May 5-8—New Orleans, La., Convention, Natural Gas Department, American Gas Association.

May 12-15—Atlantic City, N. J., Annual Meeting, National Fire Protection Association, Haddon Hall.

May 21-23—Los Angeles, Calif., National Foreign Trade Conference.

June 16-25—Berlin, Germany, World Power Conference.

June 23-26 — San Francisco, Calif., Convention, American Railway Association.

June 23-27—Atlantic City, N. J., Annual Meeting, American Society for Testing Materials.

High Spots in Field News

CALIFORNIA

California's revised curtailment plan in force. To run indefinitely.

EAST CENTRAL TEXAS

Four wildcats northwest of Van Pool were dry.

OKLAHOMA

Deeper cut in Oklahoma City Pool working out satisfactorily.

ROCKY MOUNTAIN AREA

Hobbs area showing more activity.
Deep test on Mahoney Dome, Wyoming.
Gas blowout in Idaho.

GULF COAST

New flush production at Humble, Refugio, Port Neches and Sulphur send Gulf Coast production to new peak.
Deeper sand at Refugio.

KANSAS

Rice County becoming more important.
Largest silicious lime pool in Kansas in Schurr Pool.
New spot in Sumner County.

SOUTHWEST TEXAS

More big wells in Darst Creek Field.
Kendall County wildcat bails 75 bbls.
Second well in Pettus County.

MICHIGAN

May open new pool north of Mount Pleasant Field.

NORTH LOUISIANA-ARKANSAS

Carterville Field extended.

WEST TEXAS

Best well in northern part of Pecos Valley Pool increases to 303 bbls. with 18,000,000 feet of gas.
Llano Oil Co.'s well in Ector County nearing completion; if producer, will extend pool 1 mile east and one-half mile south.
Test in Irion County, now at 7,700 feet, deepest test in West Texas outside Big Lake Pool.

NORTH TEXAS AND PANHANDLE

New find registered in Montague County fills 300 feet with oil in two hours.
Young County wildcat makes 108 bbls. initial.
Gray County proration falling short and renewed efforts for curtailment being made.
Third deep producer completed in Jack County for 150 bbls.

EDITORIAL

NEW DIVISION NEEDED

(Continued from Page 60)

many times if the proper consideration was given to utilization possibilities.

Investigation outside the industry has developed the use of paraffin containers for milk. Another investigation is showing the practical application of a domestic burner which gasifies kerosene for fuel.

These are just a few of the possibilities that await development, which undoubtedly could be multiplied many times by a definite and persistent study of opportunities by a division of utilization which could seek and gather the data on possible products and markets for the information of the industry and the general benefit.

A.P.I. WEEKLY REFINERY STATISTICS

The weekly report made to the American Petroleum Institute on refinery statistics—crude runs to stills, gasoline stocks and gas and fuel oil stocks—for the week ending March 1 follows:

	(1)	(2)	(3)	(4)
East Coast	100.0	3,412,500	8,433,000	6,391,000
Appalachian	91.0	580,500	1,679,000	677,000
Indiana, Illinois, Kentucky	98 6	2,127,500	7,804,000	3,000,000
Oklahoma, Kansas, Missouri	89 1	1,898,400	4,698,000	3,222,000
Texas	90 7	4,232,600	8,097,000	12,006,000
Louisiana and Arkansas	96 8	1,360,400	2,686,000	2,092,000
Rocky Mountain	93.6	387,100	2,925,000	1,042,000
California	99.3	4,261,500	15,868,000	109,781,000
Total United Sta es	95 5	18,200,500	52,190,000	138,211,000
Last week	95.4	17,612,700	51,734,000	138,134,000
Texas Gulf Coast	100 0	3,265,700	6,990,000	9,365,000
Louisiana Gulf Coast	100.0	817,800	2,353,000	1,261,000

(1) Per cent refinery capacity represented. (2) Crude runs to stills. (3) Gasoline stocks. (4) Gas and fuel oil stocks.

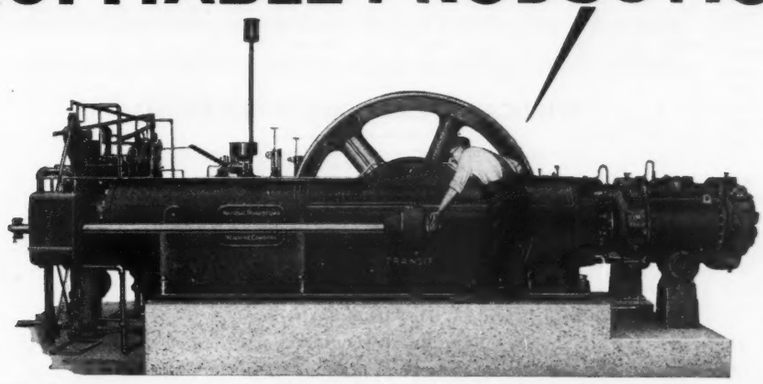
MAGNETIC STORM

The Tucson, Ariz., observatory of the United States Coast and Geodetic Survey reports that a moderate magnetic storm started at midnight of February 28, and ended at 2 p. m. on March 3, Greenwich mean time being used in both reports. The telegrams read: "Storm began 28th. zero. Moderate." and "Storm ended third fourteen."

This is the first of a series of telegrams that will be published in The Oil and Gas Journal from time to time as storms occur, in keeping with the new service established and described in the February 27 issue of this publication.

It means this much to *You*

STRENGTH-ECONOMY
RELIABILITY-UNIFORM
FLOW-CONSTANT PRESSURE
PROFITABLE PRODUCTION



TRANSIT 17x24" GAS ENGINE GAS COMPRESSOR, 170 H. P., 180 R. P. M.
DIRECT CONNECTED - FOUR CYCLE.

CATALOGUE ON REQUEST

TRANSIT

NATIONAL TRANSIT PUMP & MACHINE CO.
OIL CITY - PENN.

Deeper Cut in Okla. City Production

New Curtailment Plan Working Out Satisfactorily. Production of State Averaged 616,500 Bbls. per Day

By W. A. Spinney
Staff Correspondent, Oklahoma Fields

The increased curtailment in the Oklahoma City Pool reduced Oklahoma's production during the week to around 616,500 bbls. a day. The average initial production of the new wells completed during the week in the Oklahoma City Pool was 10,000 bbls., compared to 19,000 bbls. the preceding week. The general opinion of operators in the Oklahoma City Pool was that if the new curtailment had been delayed the production of that pool would average better than 100,000 bbls. a day for the week, and some of the companies operating in the pool estimated the daily production would have reached a new peak.

The daily production in the Oklahoma City Pool for the week ending March 3 was as follows:

Day—	Bbls.	Wells
February 25	91,834	18
February 26	80,254	18
February 27	69,877	21
February 28	89,095	29
March 1	71,740	18
March 2	57,692	13
March 3	72,384	21

The production for the above seven days averaged 76,125 bbls. per day. The production for the week ending Saturday, March 1, was 83,860 bbls. The week's production was for four days under the 25 per cent plan and for three days under the 12½ per cent plan, while the production for the seven days ending March 3 was under the 12½ per cent arrangement for six days and the difference between 83,860 bbls. a day and 76,125 bbls. indicates the good being done under the new curtailment plan even though it is based on a higher potential production.

Oklahoma City Proration

Operators in the Oklahoma City Pool agreed to a further curtailment last week, setting the maximum production at 12½ per cent of the open flow of each well. The proration plan was made effective February 26. The new proration plan was necessary because the pipe line companies found they were asked to take more oil than their needs required. Whether the new plan will adjust the situation is still problematical.

Under the old plan the situation was complicated in view of the fact that there is no storage in the field. Producing companies have only working storage on the leases, some with only 15,000 bbls. of room available. The pipe line companies have practically no storage tanks at their stations. The pipe line companies agreed to take approximately 81,000 bbls. a day, with the potential of the field estimated at 800,000 bbls. a day.

Under the new plan the wells will be permitted to flow capacity for 36 hours out of each 12-day period, with the field divided into eight different groups instead of four groups. Under the old plan the four groups were allowed to produce three days out of each 12-day period. New producers will be given a 12-hour initial gauge under the new plan instead of the full 24 hours. This method will help to reduce the daily average production in the pool.

The Hall & Briscoe's No. 3 Lindsay, SE cor. SW NW Section 3-11-3w, in the north end of the field and on the edge of the Oklahoma City limits, is completing the rig, the tallest in the field, and in all probability the first one of its kind in the Mid-Continent Field. The derrick is 157 feet high. The object of the taller derrick is said to be time saving and facility in handling long strings of drill pipe.

Skelly Oil Co.'s No. 1 Hoopes, NW cor. NE Section 31-11-2w, in the south end of the pool, is increasing its production. It is the largest Simpson sand well in the pool to date. The well made 8,236 bbls. in seven hours, which is about 1,200 bbls. an hour. It had declined to 1,000 bbls. an hour. It is believed by petroleum engineers that the well is drilling itself deeper. The company is erecting six new 1,000-bbl. tanks on the lease, which will give the lease a capacity of 41,000 bbls. storage. Same company's No. 3 Hoopes, NE cor. NW NE Section 31-11-2w, had a showing of oil and gas at 5,945-59 feet, and was drilling deeper at 6,050 feet.

Indian Territory Illuminating Oil Co.'s No. 7 Trosper, SE cor. SW SW, Section 13-11-3w, blew in making what was estimated to be 150,000,000 feet of gas from the Simpson sand at 6,246-6,364 feet. The well is shut in.

The wildcat test of the Prairie Oil & Gas Co. and others' No. 1 Sudik, C NE NE Section 8-10-2w, Cleveland County, is plugging back to test the shallow sands. The old total depth was 7,720 feet. It is pulling casing from the 6,700-foot level.

Indian Territory Illuminating Oil Co. and others' No. 3 Thomas-Fuzzell, NE cor. SE SE, Section 13-11-3w, blew in with a mighty roar last Friday, and is considered one of the large producers in the pool. The first 25 minutes the well made 893 bbls. of oil, and 1,552 bbls. the first hour and 10 minutes. Gas volume was estimated at the rate of 75,000,000 feet per day. The well was bailed down 1,500 feet before the fluid started flowing. The crownblock was first removed, leaving the top of the derrick open. When the well began flowing the strong gas pressure lifted rocks high into the air. Some weighing 50 pounds were hurled 500 feet in the air. The well made 3,524 bbls. the first 2¾ hours from Arbuckle lime at a total depth of 6,460 feet, and was then shut in.

Another test was bailed in by the same owners during the day. The No. 3 S. Bodine, SW cor. NW NW, Section 30-11-2w, only a quarter of a mile southeast of the discovery well, was bailed down to 1,800 feet, where it started to flow by heads. After more than an hour of spasmodic flowing the oil was turned into the separators, where considerable mud was deposited. The first 45 minutes the well flowed 64 bbls. of oil, the next hour it made 43 bbls. The well was drilled to a total depth of 6,638 feet, in Arbuckle lime.

The same company's No. 2 L. Canfield, NE cor. SE SW, Section 19-11-2w, started gauging 650 bbls. an hour, and 15,000,000 feet of gas. The fluid was bailed down 1,400 feet before the test began flowing. The well is producing from the Arbuckle lime at a total depth of 6,484 feet. Same company's No. 4 N. Emerson, SE cor. SW, Section 30-11-2w, blew in making 48 bbls. of oil the first 10 minutes, and what was estimated to be 20,000,000 feet of gas. The well is producing from the Simpson sand at a total depth of 6,394 feet. Same company's No. 3 B. Johnson, SE cor. NW, Section 25-11-3w, has reached a total depth of 6,554 feet, in the Simpson sand and was bailing down with 500 feet of oil in the hole. The test has been showing oil for the past month, but was drilled a few feet deeper and is testing the second time.

Mid-Kansas Oil & Gas Co.'s No. 1 C. E. Trosper, SE cor. NE SE, Section 24-12-2w, a wildcat east of the pool, is running 9-inch casing at a total depth of 6,237 feet. It is said to be the longest string of 9-inch casing ever landed in the State.

Cromwell Oil Co. and Wirt Franklin Petroleum Corp.'s No. 2 Thompson, SW cor. NE, Section 15-12-2w, a little more than a mile north of the state capital, was spudding last Friday. This new operation is between the discovery well in the county and one that was abandoned at 7,100 feet. The discovery well is a small producer and is supplying fuel to the drilling well.

The initial production of the shut-in wells in the Oklahoma City Pool that had been allowed to produce for 24 hours or less as of February 28, was 263,911 bbls. Some new wells were added to the list during the week. The initial production of each well and the approximate date each well will be opened follows:

Company, lease—	Well No.	Bbls.	Date
I. T. I. O.:			
Peterson	*1	1,025	3- 7-30
N. Emerson	*2	2,750	3- 3-30
Fortson-Farley	1	8,995	3-11-30
Cranfield-Button	1	15,675	3- 3-30
L. Farley	1	30,438	3-12-30
Drake	*2	8,780	3- 1-30
Watters	*3	2,904	None
G. Button	3	11,118	3-24-30
A. Bodine	5	19,673	3-25-30
Trosper	*8	3,594	3-18-30
Trosper	*10	16,136	3-30-30
Farley-Fuzzell	1	†28,800	4-23-30
Bodine	3	8,442	3- 5-30
Button	4	6,996	3-30-30
Trosper	9	3,538	3-21-30
A. Brokaw	2	4,599	3-24-30
Trosper	*6	1,925	3-26-30
Fortson	3	19,239	4- 5-30
Drake	*1	4,631	4-18-30
A. Bodine	4	7,200	3- 5-30
L. Trosper	1	4,080	4-23-30
A. Brokaw	1	‖7,018	4-24-30
Hiddleston	1	**1,525	4-24-30
Jones	*1	6,241	4-24-30
Trosper	5	167	4-30-30
L. Canfield	2	¶1,374	5- 2-30
N. Emerson	*2	¶3,545	5- 2-30
S. Bodine	3	¶801	5- 3-30
Thomas Fuzzell	3	‡3,524	5- 3-30
A. Bodine	6	3,612	5- 4-30
Canfield-Button	2	2,687	5- 4-30
Barker-Drake	*1	2,589	5- 4-30
Prairie:			
Hiddleston	6	14,000	4-21-30
Hiddleston	7	5,685	4-22-30
W. Franklin:			
Lowery	*4	8,376	4-23-30
Coline:			
Olds	*6	¶1,117	2-29-30
Total	36	272,799	

*Wells producing from the Simpson sand. All others are producing from the Arbuckle lime.
†Estimated.
‡2¾ hours. §3½ hours. ‖5 hours. ¶12 hours. **15 hours.

Seminole Proration Rules

Proration of production in the Greater Seminole area for the month of March will be as follows: East Earlsboro will be curtailed 66⅔ per cent of the potential. The wells will be open for full production on March 1 and 2, to constitute the potential for the first 15-day period in March. The next potential gauge will be taken March 16 and 17. All new wells will be shut down 41 days after the last string of casing has been landed and cemented. In Asher, Allen, (shallow sand), Bowlegs, Carr City, old Earlsboro, Little River, Maud, Mission, Pearson, Searight, Seminole, East Seminole, and St. Louis Pools, potentials for March will be arrived at by taking 97 per cent of the February potentials or a 3 per cent decline a month. All new wells will be required to shut down 16 days, plus 7 days for cementing casing and 1 day for testing. Allowed production will be 70 per cent of potential. In East Little River (Wilcox sand), Allen (Wilcox sand), Sasakwa, Earlsboro Townsite, and South Earlsboro Pools, wells were opened to full production on March 1 and 2, and will be opened again on March 16 and 17, to obtain the potential. The allowed production will be 70 per cent of the potential. All new wells are required to shut down 16 days, plus 7 days for cementing and 1 day for testing. In the Konawa and East Little River (Cromwell sand) Pools, allowed production will be 25 per cent of the potential. Required shut down time on new completed wells will be adjusted by the umpire. Wells are to be open to full production March 1 and 16 to

(Continue on Page 96)

WILDCAT OPERATIONS IN OKLAHOMA

(Descriptions are East and North unless marked otherwise)

NORTHERN OKLAHOMA

ALFALFA COUNTY

Company, farm and location—	Remarks:
Smith Brothers' No. 1 Forbes, SE cor. NW NW, Sec. 12-27-11w	Shut down 1,232 ft.
J. W. Bailey's No. 1 Acre, SW cor. NE, Sec. 14-24-11w	Rigging up standard tools 4,660 ft.

BECKHAM COUNTY

Kay et al's No. 1 Martin, C E half E half NW, Sec. 32-8-24w	Drlg. 3,255 ft.
Producers Exploration Co.'s No. 1 Seidell, SE cor. SW SW, Sec. 17-9-22w	Shut down 2,402 ft.
Carson et al's No. 1 Danby, SW cor. SE NE, Sec. 20-8-22w	Shut down 1,575 ft.

BLAINE COUNTY

Lowen et al's No. 1 Unknown, NW cor. SW NW, Sec. 17-16-11w	Spudded and shut down.
Washoma Oil Co. et al's No. 1 Phillips, C NW SW, Sec. 12-19-10w	Shut down 2,935 ft.

CADDO COUNTY

Abernathy & Brown's No. 1 Horton, SE cor., Sec. 8-6-13w	Shut down 596 ft.
W. J. Hartley's No. 1 Galbreath, SE cor. NW SE, Sec. 29-5-12w	Shut down 3,394 ft.

CLEVELAND COUNTY

Harris et al's No. 1 Highbee, SE NW, Sec. 20-6-1	Drlg. 3,230 ft.
Daniels & LeWright's No. 1 Vandever, C SW, Sec. 15-7-1w	Shut down 3,130 ft.
Phillips Petroleum and T. B. Slick's No. 1 Sudick, NE cor. NE, Sec. 8-10-2w	Wilcox 7,716-20 ft.; water; plugging back.

COAL COUNTY

W. E. McGraw's No. 1 King, C SW NE, Sec. 11-1-8e	Shut down 1,235 ft.

COMANCHE COUNTY

Pelwine Oil's No. 1 Howe, C SE SW, Sec. 33-1-9w	Rig.
G. W. Stogner's No. 1 Doebel, C SW SW, Sec. 3-3-9w	Shut down 150 ft.
Green et al's No. 1 Wilson, C NE SW, Sec. 14-1-12w	Shut down 4,055 ft.

GARFIELD COUNTY

Shell Petroleum Corp.'s No. 1 Loomis, C NW NW, Sec. 32-23-4w	Drlg. 2,241 ft.
Continental and Barnsdall's No. 1 Brown, CNL SW, Sec. 10-20-4w	Drlg. 5,180 ft.
E. L. Love et al's No. 1 White, SE cor. NW, Sec. 9-24-6w	Shut down 5,566 ft.

GRADY COUNTY

J. V. Bailey's No. 1 Hubbard, C NE NW, Sec. 1-10-6w	Spudded and shut down.

(Continued on Page 269)

One Out Of Every Four

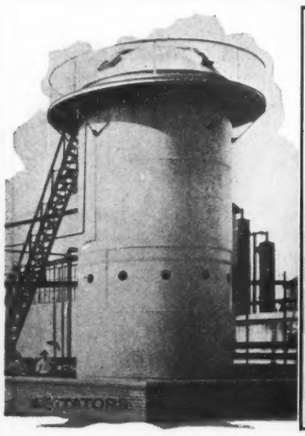
More than 50,000 men, women and children are customers of The First National Bank and Trust Company. This gives a First National bank book to one out of every four persons in Oklahoma City.

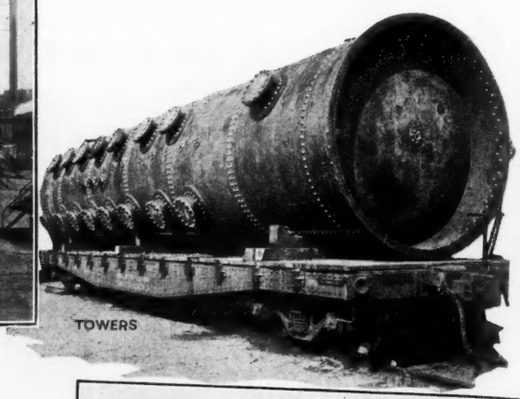
To win and hold the confidence of a community to such an extent as this a bank must be safe and dependable—exact in its dealings and friendly in its relationships.

Isn't that the kind of an institution you want to use in transacting your Oklahoma City business?

Eleven of the First National's directors are oil operators. Several others are interested in the oil industry financially. These men bring an understanding of *your* business to the direction of this bank's affairs.

The FIRST NATIONAL BANK
AND TRUST COMPANY
Of Oklahoma City
1ST Since 1889





For refinery plate work and field erected tanks

We appreciate the opportunity of submitting prices on refinery plate work — such as agitators, absorbers, bubble towers, condenser boxes, crude stills, etc. . . . on field erected storage tanks, rundown and pressure tanks in a wide range of capacities . . . on riveted or welded pipe and tanks; Hortonspheres for pressure storage; Gasholders, etc. In territory served by our Birmingham plant, we are also equipped to supply cylindrical, riveted-up tanks.

Horton tanks are built to our standard design, A.P.I. specifications, or special designs to meet customers' needs. They can be equipped with ordinary steel roofs or with our Wiggins Roofs for the prevention of evaporation and fire. Wiggins Roofs are also installed on any existing tank in good condition.

The Wiggins Floating Roof

The Wiggins Floating Roof is particularly applicable to working tanks. It rides on the oil in the tank at all levels, blanketing the surface. Air cannot come in contact with the oil to carry vapor away. By eliminating the air space in a tank the contents cannot ignite and fire is prevented.

The Wiggins Breather Roof

The Breather Roof stops evaporation on storage tanks in a different manner than the Floating Roof. The Breather Roof is fastened solidly to the top angle of the tank and flexes up and down as the vapor in the tank expands and contracts. No vapor is forced out through the vents and no fresh air is drawn in to carry away more vapor.

Four Plants to Serve You

No installation is too large or too small for our organization to handle. Plants in Birmingham, Alabama, Chicago, Illinois, Greenville, Pennsylvania, and Bridgeburg, Ontario insure quick service. All large equipment is erected complete with our own experienced erection crews. Address our nearest office for quotations or information on the products listed below.

Chicago Bridge & Iron Works

Dallas	3341 Magnolia Bldg.	Philadelphia	1615 Jefferson Bldg.
New York	3147 Hudson Terminal Bldg.	San Francisco	1054 Rialto Bldg.
Cleveland	2204 Union Trust Bldg.	Boston	1517 Consolidated Gas Bldg.
Chicago	2128 Old Colony Bldg.	Birmingham	1536 50th Street, N.
Detroit	1514 Lafayette Bldg.	Havana, Cuba	Apartado 2507

Send for a copy of this Booklet.

Oil Storage Tanks • • • Wiggins Roofs • • • Hortonspheres • • • Rundown Tanks • • • Cylindrical Tanks • • • Elevated Tanks • • • Standpipes • • • Pressure Tanks • • • Agitators • • • Absorbers • • • Bubble Towers • • • Condenser Boxes • • • Crude Stills • • • Refinery Equipment • • • Tank Cars • • • Smokestacks • • • Gas Holders • • •

Cartersville Pool, Louisiana, Extended

Well There Increases Flow to 200 Bbls. Higher Stratum of Woodbine Also Found in That Field. Many New Locations

By D. H. Bancroft
Staff Correspondent, Louisiana-Arkansas

SHREVEPORT, La., Mar. 3.—Triangle Drilling Co.'s No. 1 Kilpatrick, SW NE, Section 7-19-15w, Claiborne Parish, Louisiana, continues to interest the oil fraternity with its behavior. During the past week it tested 1,000,000 feet of gas and a spray of about 10 bbls. of oil daily from a sand in the Glen Rose at total depth of 4,540 feet. Later it was deepened to 4,558 feet with 10 feet of sand and is being bailed at that depth.

Cartersville, Bossier Parish, Louisiana, was also in the limelight, being extended a half mile south and west during the week by The Texas Company's No. 1 Wilkinson, SW NE, Section 36-23-12. The well came in at total depth of 3,161 feet flowing 140 bbls. daily through 2½-inch tubing. Later the daily yield mounted to 200 bbls. a day. It is west of the original discovery well of Muslow Oil Co., the Kilgore A-1, Section 31-23-11, and south of the Louisiana Petroleum Co. and others' western extension producer in Section 25-23-12. The Wilkinson well is an old gasser deepened from 3,073 feet. Four and a half-inch casing was set at 3,134 feet. There was 10 feet of sand immediately above 3,157 feet, the last 4 feet in the hole being shale.

Cartersville and Zwolle, Sabine Parish, Louisiana, divided honors in new locations made during the week, the former securing 20 new tests and the latter getting 13. The 38 new locations announced during the week was the largest in this territory since Smackover passed its peak, aside from some intensive drilling in the Monroe gas field last year.

The major part of the play in Cartersville is in Section 25-23-12, while in Zwolle it has developed between No. 1 Bowman-Hicks of Benedum & Trees in Section 34-8-12 and a 3-mile western extension of the Zwolle east field a fortnight ago by Lion Oil Refining Co. and Lide and others who completed their No. 1 Sabine Lumber Co. in Section 31-8-12, in marl at 2,197 feet.

Production

Daily average production of the pools in this area during the past week follows:

LOUISIANA	
Caddo, light	10,340
Caddo, heavy	2,695
Homer	3,575
Haynesville	4,540
DeSoto-Red River	3,100
Elm Grove	465
Bellevue	580
Cotton Valley	2,100
Urania	5,020
Pleasant Hill	740
Sarepta	3,320
Zwolle	5,320
Total Louisiana	41,795
ARKANSAS	
El Dorado	4,110
Champagnolle	4,290
Lisbon	1,020
Smackover, light	5,130
Smackover, heavy	41,660
Stephens	965
Nevada	1,110
Bradley	85
Mount Holley	140
Total Arkansas	58,510
Total both states	100,305
Week ending February 22	99,860
Increase	445

Discover Higher Stratum

Considerable interest was aroused by the discovery of a higher stratum of the Woodbine in Cartersville by the Air Lift Oil Co. and Bahan & Bahan in No. 1 G. W. Mays, NW NW, Section 26-23-12, which tested 18 fourbles of oil and 3 fourbles of salt water in 15 minutes in a drill stem test from 2,960-70 feet. Six and five-eighths inch casing is being set at the higher level for a test. This horizon is approximately 100 feet above the old Cartersville gas field's producing horizon which is 100 feet above the oil producing horizon uncovered at 3,164 feet in the Muslow Oil Co.'s No. 1-A Kilgore.

The Hillsboro district of Union County, Arkansas, added another small producer during the week in Wisinger & Ball's No. 1 Lacey, NE NW, Section 6-18-15, which is pumping 15 bbls. daily from total depth of 2,205 feet.

Interest at Zwolle was aroused by the bailing of A. H. Tarver and the Shreveport-El Dorado Pipe Line Co.'s No. 1 State Bank, SE NW, Section 27-8-12, where a 13-foot break in the chalk was encountered from 2,437-50 feet after the well had tested 20 feet of oil in the chalk rock at 2,373 feet.

This test is slightly over 1 mile due north of Benedum & Trees' No. 1-A Bowman-Hicks, Section 34-8-12, completed November 26 by R. L. Gay, trustee, 12 miles east of the Blue Lake district's production.

Should Tarver's test be a producer, it will create additional speculation as to the Zwolle east field formation as Olsan Brothers and Ingall's No. 1 Hooker, SW SE, Section 27-8-12, is almost on a direct line between these tests and it bailed dry a number of times in the chalk rock and now has about 40 feet of oil in the hole at total depth of 2,625 feet. Several "shots" were taken in this hole to increase the oil but without appreciable result.

Failure at Zwolle

Zwolle recorded its first official failure when J. C. Tippett drilling for Louisiana Oil Refining Corp. abandoned No. 1 Hughes, SW NW, Section 36-8-12, 2 miles east of the Benedum & Trees' producer, as a dry hole at total depth of 2,600 feet. The well had bailed dry at several higher levels in the chalk rock.

Benedum & Trees' No. 1 Johnson, NE NE, Section 7-11-13, Spider district, DeSoto Parish, after testing 25 forbules of salt water at 2,829 feet drilled deeper to 2,865 feet and tested 2,880,000 feet of gas and a spray of salt water. Eight and one-quarter inch casing is now being set at 2,855 feet.

In the same parish, Benson Oil & Gas Co.'s No. 1 Harris, Section 6-10-13, tested dry with a show of gas at 3,650 feet and is shut down waiting orders.

H. L. Hunt and others led in number of new locations in the Cartersville Field, announcing seven tests on the J. W. Peyton lease in Section 25-23-12. No. 4 J. W. Peyton has been spudded in and is drilling after 10-inch casing was set at 100 feet. Louisiana Petroleum Co., which is associated with Hunt in Cartersville, has derricks up for Nos. 1 and 2 H. H. Bain in SW NW, Section 31-23-11. Muslow Oil Co. is rigging up Nos. B-2 and B-3 for Kilgore in NW NW of the same section. Delaware-Louisiana Development Co. is rigging up for No. 6 Bolinger in Section 38-23-11. Magnolia Petroleum Co. is preparing to deepen No. 1 Dodson and No. 1 Roberson in Sections 16-23-12 and 26-23-12, respectively, the former having a total depth of 3,085 feet

(Continued from Page 231)

WILDCAT OPERATIONS IN LOUISIANA-ARKANSAS

NORTH LOUISIANA
BOSSIER PARISH

Company, farm and location—	Remarks—
H. S. Autrey's No. 1 Smith, 200 ft. S, 200 ft. W, NE cor. NW NW, Sec. 26-19-11	O.W.D.D; T.D. 1,836 ft; plugged back to 1,500 ft. and cmtd. 4½-in; bailing to test; T.D. 1,510 ft.
Nell & Lanier's No. 1 Biedenharn, SE cor., Sec. 23-21-14	W.O.S.R; 980 ft. oil in hole; T.D. 998 ft; arranging to re-test at 998 ft.
S. P. Lanier's No. 1 Le Rosen, 300 ft. S, 1,000 ft. W, NE cor., Sec. 26-21-14	Derrick.
Walker et als' No. 1 Antrim,NW cor. SE, Sec. 28-22-13	S.D. 3,184 ft.
C. L. West et als' No. 1 Sentell & Dickson, 2,310 ft. W, 895 ft. N, SE cor., Sec. 3-20-13	Arranging drill stem test 1,900 ft.
Del.-La. Dev. Co.'s No. 6 Bolinger, 330 ft. S, 220 ft. W, NW cor. Lot 17, in Lot 16, Sec. 31-23-11	Location.
H. L. Hunt, Inc.'s No. 4 J. W. Peyton, Sec. 25-23-12	Location.
H. L. Hunt, Inc.'s No. 5 J. W. Peyton, 990 ft. W, 330 ft. S, NE cor. SE, Sec. 25-23-12	Location.
H. L. Hunt, Inc.'s No. 6 J. W. Peyton, 990 ft. S, 990 ft. W, NE cor. SE, Sec. 25-23-12	Location.
H. L. Hunt, Inc.'s No. 7 J. W. Peyton, 990 ft. S, 990 ft. E, C, Sec. 25-23-12	Location.
H. L. Hunt, Inc.'s No. 8 J. W. Peyton, 990 ft. E, 330 ft. S, C, Sec. 25-23-12	Location.
H. L. Hunt, Inc.'s No. 9 J. W. Peyton, 330 ft. S, 330 ft. E, C, Sec. 25-23-12	Location.
H. L. Hunt, Inc.'s No. 10 J. W. Peyton, 990 ft. S, 330 ft. E, C, Sec. 25-23-12	Location.
La. Pet. Corp.'s No. 1 Bain, 330 ft. S and W, NE cor. SW NW, Sec. 31-23-11	Location.
La. Pet. Corp.'s No. 2 Bain, 330 ft. S and E, NW cor. SW NW, Sec. 31-23-11	Location.
Magnolia Pet. Co.'s No. 1 E. C. Dodson, Sec. 16-23-12	Location.
Magnolia Pet. Co.'s No. 2 Matlock, 330 ft. S and W, NE cor. SE SW, Sec. 25-23-12	Location.
Magnolia Pet. Co.'s No. 1 Roberson, Sec. 26-23-12	Location.
Muslow Oil Co.'s No. 1 Barnett, 1,002 ft. N, 990 ft. W, SE cor., Sec. 25-23-12	Location.
Muslow Oil Co.'s No. 1 Floyd, 990 ft. S, 330 ft. W, C, Sec. 25-23-12	Location.
Olsen Bros. & Ingalls' No. 1 Roberson, Sec. 25-23-12	Location.
Phillips Pet. Co.'s No. 1 Floyd, 330 ft. S, 330 ft. W, C, Sec. 25-23-12	Location.
CADDO PARISH	
Magnolia Pet. Co.'s No. 1 Swann, 330 ft. N, 330 ft. W, SE cor. NE SW, Sec. 16-21-14	Rig up.
L. B. Mawk's No. 1 Swann, 440 ft. N, 200 ft. E, SW cor., Sec. 23-21-14	Derrick.
R. W. Norton's No. 1 Hill, 630 ft. N, 1,260 ft. W, SE cor. NE, Sec. 33-23-16	D.S. test 8-ft. sand 4,479 ft; S.W; S.D. 4,496 ft.
I. N. Pharis, trustee's No. 1 Oden, NE cor. SE NE, Sec. 16-19-14	S.D. 2,322 ft; topped sand at 2,396 ft; set 6⅝-in; T.D. 2,409 ft.

(Continued on Page 224)

LOUISIANA-ARKANSAS PROVEN AREAS

NORTH LOUISIANA
BOSSIER PARISH—CARTERVILLE

Company, farm and location—	Remarks—
Bahan & Bahan's No. 1 G. W. May, 660 ft. S, 660 ft. W NE, cor., Sec. 26-23-12	Drlg. 2,700 ft.
Bahan & Bahan's No. 1 Floyd Pleasant, 150 ft. N, 150 ft. W, C, Sec. 25-23-12	Derrick.
Del.-La. Dev. Co.'s No. 2 Bollinger, 200 ft. N, 200 ft. W, SE cor. NE, Sec. 31-23-11	S.W.; abd.
Greenwood Prod. Co.'s No. 1 Bollinger, 1,980 ft. N, 1,150 ft. E, SW cor. SE, Sec. 36-23-12	O.W.D.D. 3,071 ft.
Goodman-Johnson's No. 1 Martin, 330 ft. S, 330 ft. E, NW cor. SE, Sec. 26-23-12	W.O.S.R; T.D. 3,169 ft.
Lee Kinnebrew's No. 1 Garnett, 200 ft. S, 200 ft. W, NE cor. SW NW, Sec. 36-23-12	Began drlg. Feb. 23; set 12½-in. 100 ft.
La. Pet. Corp.'s No. 1 J. W. Peyton, 1,170 ft. S, 150 ft. W, NE cor. SE, Sec. 25-23-12	Cmtd. 6⅝-in. 3,116 ft.
La. Pet. Corp.'s No. 3 Peyton, 660 ft. S, 150 ft. W, NE cor. SE, Sec. 25-23-12	Cmtd. 6⅝-in. 3,113 ft; T.D. 3,117 ft.
Lide et als' No. 1 Farrington, 330 ft. N, 330 ft. W, SE cor. NW NW, Sec. 23-23-12	Rig up.
La. Oil Ref. Corp.'s No. 1 Matlock, 2,970 ft. S, 990 ft. E, NW cor., Sec. 26-23-12	Rig up.
H. L. Hunt's (was Love et als') No. 1 Allen, SE cor. NE NE, Sec. 30-23-11	Rig up.
Muslow Oil Co.'s No. 1 Barnett, 1,320 ft. W, 660 ft. N, SE cor., Sec. 25-23-12	Abandoned.
Muslow Oil Co.'s No. 1-B Kilgore, 3,050 ft. N, 1,930 ft. E, SW cor., Sec. 31-23-11	2,500 ft. oil in hole; W.O.S.R; 3,167 ft.
Muslow Oil Co.'s No. 1 Mark Myer, 1,980 ft. N, 330 ft. W, SE cor., Sec. 36-23-12	Arranging to deepen; T.D. 3,088 ft.
Muslow Oil Co.'s No. 2 Peyton, Sec. 30-23-11	Rig up.
Muslow Oil Co.'s No. 3 Peyton, Sec. 30-23-11	Set 10-in. 294 ft; drlg. 700 ft.
Northwest La. Gas Co.'s No. 5 Bollinger, 252 ft. E, 200 ft. S, NW cor. Lot 7, Sec. 31, in Sec. 38-23-11	Arranging to set 6⅝-in. 3,167 ft; T.D. 3,170 ft.
Nat. Gas Prod. Co.'s No. 1 U. S. Govt., 660 ft. N, 660 ft. W, C, Sec. 31-23-11	W.O.S.R. 3,194 ft.
Nat. Gas Prod. Co.'s No. 2 U. S. Govt., NW cor. SE NW, Sec. 31-23-11	Drlg. 1,900 ft.
Nat. Gas Prod. Co.'s No. 2 U. S. Govt., NW cor. SE NW, Sec. 31-23-11	Rig up.
Nat. Gas Prod. Co.'s No. 3 U. S. Govt., 1,520 ft. S, 2,580 ft. E, NW cor., Sec. 31-23-11	Location.
Nat. Gas Prod. Co.'s No. 4 U. S. Govt., 2,440 ft. S, 2,580 ft. E, NW cor., Sec. 31-23-11	Location.
Palmer Corp.'s No. 4 Roberson, 660 ft. E, 660 ft. S, NW cor. NW NE, Sec. 26-23-12	2,000 ft. oil in hole; W.O.S.R; T.D. 3,175 ft.
Phillips Pet. Co.'s No. 1-A Bollinger (formerly Sales & Walker's No. 4 Bolinger), 696 ft. S, 1,120 ft. E, NW cor. SW, Sec. 30-23-11	Perforated 6⅝-in. 3,113-23 ft; 900 ft. oil in hole; T.D. 3,247 ft.

(Continued on Page 222)

Added Importance of Rice County

Largest Silicious Lime Well in Kansas in Schurr Pool. New Producing Spot in Sumner County. Expiring Leases

By W. A. Spinney
Staff Correspondent, Kansas Fields

A new drilling campaign is expected to develop in the Peasel Pool, 5 miles northwest of Wellington, Sumner County, Kansas. The discovery well, which found oil three months ago (in November, 1929), was drilled by Slick, Pryor and Lockhart and the Derby Oil & Refining Corp. It was pinched to around 80 bbls. a day and no attempt was made to further develop the area. The discovery well is producing from the chat.

Carter Oil Co. is moving in the west offset located in the NE cor., Section 32-21-1w, Sumner County. This test may result in the other offset owners starting tests. The Sunray Oil Corp. and Gardner Petroleum Co. own the northwest offset in the SE cor., Section 29-21-1w, and the Sinclair Oil & Gas Co. may start the north offset in the SW cor., Section 28-21-1w.

The discovery well was drilling deeper in the chat which was found at 3,657-68 feet. The well made 200 bbls. after being deepened. It was cleaned out and swabbed before it began to flow. The owners of the discovery well have 1,280 acres under lease in the vicinity. It is probable the Kansas proration committee will ask that a 50 per cent curtailment of the production be made in the pool if the area develops large wells.

Three tests are nearing the pay horizon in the Greenwich area in Sedgwick County, with hopes of extending the production in that area. Smith & Ash's No. 1 Tripp, NE cor. SW, Section 22-26-2, a half mile south of the Greenwich townsite, had Simpson sand at 3,304-06 feet, with a showing of oil, and was shut down to land the casing. Another test was the Shell Petroleum Corp.'s No. 2 C. Lygrisse, in the NW cor. NE, Section 22-26-2. It was drilling at 2,875 feet, and expected to reach the chat in a few days. The third test in the area was Graham Brothers and others' No. 1, in Section 22-26-2, on the southwest edge of the townsite. It was drilling at 1,600 feet.

Rice County Added Importance

In Rice County, the latest county in which large production has been found in Siliceous lime, the Independent Oil & Gas Co.'s No. 1 Metzger, SW cor. NE NE, Section 21-20-10w, in the Schurr Pool, was increasing its production. The well is making around 1,500 bbls. and some estimated it was capable of making 2,000 bbls. a day and is believed to be the largest Silicious lime well in the State. The pay horizon was found at 3,329-41 feet, and from the latest reports it was not making any water. Vickers Petroleum Co.'s No. 1 Binger, NW cor. SE, Section 21-20-10w, is rigging up to drill deeper the first part of the week. Derby Oil & Refining Co.'s No. 1 Johnson, C NW cor. NE SE, Section 24-20-6w, a wildcat in the eastern part of the county, was landing casing on top of the chat at 3,264 feet, where a showing of oil was found.

A new wildcat location was made southwest of Caldwell in Sumner County in the course of the week, J. Garfield Buell and others' No. 1 A. C. Showalter, SE cor. NE SE, Section 4-35-3w, Sumner County. The new location is between the production in the State Line Pool and a deep dry hole drilled by the Gypsy Oil Co., No. 1 Clark, SE cor., Section 31-35-3w. Other operations in the county were the Blackwell Oil & Gas Co.'s No. 1 Clift, SE cor. NW, Section 26-33-3w, north of Caldwell, drilling at 1,200 feet; Lario Oil & Gas Co.'s No. 1 Osborne, NE cor. SE, Section 21-30-1w, a wildcat northwest of Wellington, water in the chat at 3,590-3,605 feet, and drilling deeper at 3,895 feet; Champlin Oil & Refining Co.'s No. 1 Murray, NW cor. SE, Section 9-30-2w, fishing at 3,575 feet; same company, building a rig for No. 5 Love, SW cor. NW SW, Section 9-30-2w; Payne and others' No. 1 Fredrick, NE cor. SW SE, Section 12-31-2, in eastern Sumner County, hole full of water in sand at 2,282-2,325 feet and underreaming 8-inch casing at 2,415 feet.

Biddle Pool Extended

The Biddle Pool, northeast of Winfield, in Cowley County, was extended during the last week. Roth & Farout's No. 1 Holt, SW cor. NE SW Section 12-32-4, has run tubing and rods to pump the new well. The well had been flowing by heads and if the tubing does not handle the oil larger equipment may be installed. The oil is coming from pay sand at 2,588-90 feet, where it began flowing 10 bbls. an hour. It flowed and swabbed 192 bbls. in 11 hours, with considerable gas. The new well is located a quarter mile west of previous production in the district.

J. A. Hull Co.'s No. 16 Wallace, C NW cor. NE SE Section 24-32-4, Cowley County, was drilling deeper at 2,665 feet. It was expected to reach the Bartlesville sand in a few days.

In the eastern part of the county, Brinneger Brothers and others' No. 2 Reidy, in Section 31-31-8, was preparing to spud. It was offsetting the same company's No. 1 Reidy, in the territory east of Cambridge. Ramsey and others' No. 1 Denton, in Section 30-31-8, Cowley County, was drilling at 2,250 feet.

Two wells are expected to be completed in the Voshell Pool, McPherson County, during the week. Indian Territory Illuminating Oil Co.'s No. 2 Voshell, SE cor. NE NW Section 9-21-3w, had the top of the Viola lime at 3,360 feet. Shell Petroleum Corp.'s No. 1 Stuckey, NE cor. SE SE Section 9-21-3w, was drilling on cement at 3,295 feet after landing the casing.

Voshell Extended

Gypsy Oil Co.'s No. 1 Krehbiel, SW cor. Section 3-21-3w, extends production in the Voshell Pool of McPherson County to the northeast. The oil was found in the Wilcox sand at 3,357-59 feet where oil rose 2,000 feet in the hole in two hours, and in four hours the hole was full of oil. It was the eleventh producer completed in the pool. The well is the northeast offset to the discovery well in the pool drilled by Ted Washabaugh and others. Gypsy Oil Co.'s No. 1 Stuckey, SW cor. SE NW Section 10-21-3w, had the top of the chat at 3,103 feet, which was considered by some to be low of the structure.

Dixie Oil Co.'s No. 1 Voshell, NE cor. SE NW Section 9-21-3w, was landing the 6-inch casing on top of the Viola lime at 3,384 feet. The Empire Oil & Refining Co.'s No. 1 Voshell, NE cor. NW Section 9-21-3w, swabbed 1,007 bbls. in 15 hours from the Wilcox sand at 3,312-15 feet.

Three new locations were announced for the Voshell Pool in the past week. Shell Petroleum Corp.'s No. 1 Koehn, NE cor. Section 16-21-3w, is the most southerly location in the pool. Same company's No. 6 Stuckey, SE cor. Section 9-21-3w, the north offset to the above test. The Texas Company made the other location for No. 2 Stuckey, SW cor. Section 10-21-3w.

In the Ritz Pool, Shell Petroleum Corp.'s No. 1 Koehn, in Section 12-20-2w, McPherson County, has the top of the chat at 2,946 feet. The test is located on the north side of the pool.

Gibson-Zahniser Oil Co.'s No. 1 Mueller, C SW, Section 11-23-14w, Stafford County, the only wildcat test drilling in the county, was landing the 6-inch casing at 3,705 feet. It is believed more lands are under lease in this county than in any other western county in the State. It is reported that 90 per cent of the acreage is leased at the present time, either in blocks or checkerboards. The eastern part of the county is in the trend with the new Schurr Pool in the Raymond district in Rice County, and is believed to be on the Ellsworth Arch.

Many Leases Expire in 1930

Western Kansas may be due for an extensive amount of new drilling during 1930, unless the oil companies succeed in inducing the landowners to grant them renewals with no drilling obligations. A considerable number of five-year leases in various counties in the western and central part of the State will expire this year. McPherson County in particular is thus affected. Some of the leases are in areas where the renewal prices are high and immediate tests required. The same situation applys to checkerboard leases in the area west of Sedgwick and Harvey Counties, namely in Reno, Rice, Kingman, Stafford and Pratt Counties. These counties are leased up to 75 per cent of the total acreage and with many different companies represented, no one company has enough acreage to justify the drilling of a wildcat well in areas where there is no positive geological information. The possibility of community tests may help solve the situation.

F. E. Jones & Son's No. 1 Black, NE cor. NW NE, Section 31-23-6, northeast of DeGraff, Butler County, was abandoned at a total depth of 2,666 feet. The test was carrying a hole full of water and there was some difference of opinion as to what formation the bit was in when the test was abandoned. In the southern part of the county W. G. Sanford and others' No. 1 Houston-Brooks, NE cor. NW SW, Section 12-28-5, was drilling at 2,300 feet, and was expected to reach the Bartlesville sand in a few days. West of Potwin, R. Ramsey and others' No. 1 Wilkinson, SE cor. NW, Section 25-24-3, on the west side of the county, was landing the 8-inch casing at 2,200 feet. The producing horizon in the area is found around 2,700 feet.

In the south end of the Seeley Pool Simmons and Phillips Petroleum Co.'s No. 2 Patterson, NW cor. SE SW, Section 22-23-11, Greenwood County, was skidding the rig 200 feet south. It will place the rig 400 feet north of the No. 1 Patterson on the same property. The rig has been up for several weeks pending the outcome of the Simmons & Rhodes No. 5 Patterson in Section 22-23-11, which proved to be a 75-bbl. well.

Butler County

Sanford and others' No. 1 Covert "A," NE cor. SE SW, Section 3-28-5, is a rig. Aladdin Petroleum Co.'s No. 2 Klingler, NE cor. SW NE, Section 24-27-3, is dry and abandoned at 3,064 feet. Phillips Petroleum Co.'s No. 5 Tatum, SE cor. NE NW, Section 9-27-6, has been abandoned at 3,372 feet.

Chase County

Transcontinental Oil Co. and others made location for No. 1 Wessell, NE cor., Section 36-20-9. Polhamus and others' No. 1 Leedy "C," SW cor. SE, Section 25-22-9, made 25 bbls. in sand 2,571-88 feet.

Chautauqua County

Alter and others staked location for No. 1 Kingston, SW cor. SE NW, Section 8-33-11. Theta Oil Co.'s No. 2 Julian, NE cor. SE NW, Section 12-32-10, has been completed for 500,000 feet of gas in sand 1,995-2,012 feet.

Coffey County

Ellis and others' No. 1 Rosillion, SW cor. SE NW, Section 6-23-15, is a rig. Shaffer & Howell's rig is up for No. 1 Levering, SW cor., Section 7-23-15.

Cowley County

Fine and others' No. 1 Brown, SE cor., Section 8-32-4, is dry and abandoned at 3,325 feet.

Greenwood County

Simmons and others staked location for No. 1 Fankhouser, SW cor., Section 21-22-12. Derby Oil Co. and others' No. 5 Young, NW cor. NE SE, Section 22-22-13, is spudding. Gore & Phillips' No. 2 Blanck, NW cor. SW SE, Section 29-22-13, is a rig. Simmons and Amerada Petroleum Corp. built the rig for No. 1 Wineger, NE cor. SE, Section 27-23-11. Waltom Oil Co. made location for No. 1 Noll, SW cor., Section 23-23-12. No. 1 Berry, NE cor. SE, Section 34-23-13, is a rig. Syndicate Oil Co.'s No. 3 Shook, NW cor. SW NW, Section 6-24-12, is spudding. Sheedy and others' rig is up for No. 6 Sharp, C NW NE, Section 5-24-13. Young and others' No. 2 Bowman,

(Continued on Page 231)

WILDCAT OPERATIONS IN KANSAS

(Descriptions are East unless otherwise marked)

Company, farm and location—	Remarks:
BARBER COUNTY	
Skelly Oil Co.'s No. 1 Temple Ranch, Section 13-34-15w	Drlg. 4,790 ft.
Robertson et al's No. 1 Powell, SE cor. SE Sec. 11-32-10w	Shut down 3,955 ft.
BARTON COUNTY	
Prairie's No. 1 Davidson, NW SE Sec. 4-16-11w	Drlg. 2,315 ft.
BUTLER COUNTY	
Shell Petroleum Corp.'s No. 1 Harper, SW NE Sec. 35-26-3	Drlg. 3,044-46 ft.; water.
Martin et al's No. 1 Flanigan, C SW SE SW Sec. 29-27-3	Drlg. 2,035 ft.
CHASE COUNTY	
Urschell et al's No. 1 Lipps, C SW SW Sec. 27-18-6	Drlg. 700 ft.
Steinbuckel et al's No. 1 Stephenson, NE SW Sec. 4-20-6	Drlg. 965 ft.
Steinbuckel et al's No. 1 Cook, SE cor. Sec. 21-19-8	Drlg. 925 ft.
E. W. Marland, Inc.'s No. 1 Altemus, SE NE Sec. 33-18-6	Drlg. 1,650 ft.
CLAY COUNTY	
Chrisler et al's No. 1 Tivier, SW cor. Sec. 19-8-3	Shut down 50 ft.
COWLEY COUNTY	
Prairie O. & G. Co.'s No. 1 Dosbaugh, SE cor. Lot 27, Sec. 18-32-8	Rig.
Edenfield & Fair's No. 1 Wallace, CWL NE Sec. 17-34-4	Shut down 365-75 ft.; 2,000 ft. gas.
Fine et al's No. 1 Brown, SE cor. Sec. 8-32-4	Silicious 3,303-25 ft.; abandoned.
Milton & Mead's No. 1 Tatum, SE cor. SW Sec. 11-31-6	Shut down 2,000 ft.
DICKINSON COUNTY	
Emery-Curtis & Bryan's No. 1 Hevner, NW SE Sec. 31-13-3	Rig on ground.
Cress' No. 1 Sanden, NE cor. Sec. 12-15-2	Rig.
Prairie's No. 1 Lachard, C NW SW NE Sec. 12-16-2	Drlg. 2,685 ft.
Hiatt & Durham's No. 1 Wendt, NW cor. Sec. 17-16-2	Spudding.
Kruger et al's No. 1 Diche, C NW NE NE Sec. 17-13-4	Shut down 2,390-2,400 ft.; water.

(Continued on Page 270)

More Big Wells in Darst Creek Field

Potential Production Above 100,000 Bbls. Kendall County Wildcat Bails 75 Bbls. of Oil. Second Well in Pettus County

By B. D. Stevenson
Staff Correspondent, Southwest Texas Fields

SAN ANTONIO, Tex., Mar. 3.—Several more big wells in the Darst Creek Field have put the potential production of that area considerably above 100,000 bbls. per day but the production is prorated to 10,000 bbls. for the field outside of the Magnolia and Turman wells. These wells will add another 2,000 to 3,000 bbls. to the actual production and 12,000 to 15,000 to the potential.

During the past week Magnolia Petroleum Co. tested eight joints of oil on a drill stem test in its No. 6 Benavides in the O'Hern-Seacord Pool in Duval County. There has been 75 bbls. or more of oil bailed out of the Sterling No. 1 Willie Werner in Kendall County, a pure wildcat. Several wells are near completion in the new Williamson County area and keen activity in the Pettus territory in Bee County where the second oil well has come in at nearly 4,000 feet, has kept Southwest Texas interesting.

The Sterling well in Kendall County is on the upper side of the Balcones fault and is of considerable importance. It is almost the first test for oil ever drilled in the county and is on the north side of the Balcones in a country where the only knowledge the geologist has is surface knowledge. It being now proven that there is some oil in the structure on that side of the Balcones there will undoubtedly be a drilling campaign. Some new tests have already started and there are a half dozen slated to be drilled.

Pettus Area

Probably the most important new area in Southwest Texas is the Pettus area where the Union Producing Co.'s No. 5 Ray, a north offset to the Houston Oil Co.-Humble Oil & Refining Co.'s No. 1 McKinney, came in the past week shooting over the crown block, on a drill stem test. The tester was immediately closed and came out with 19 fourbles of oil (1,500 feet). Casing was set at 3,953 feet and the total depth is 3,971 feet. The total depth and elevation of No. 5 Ray are practically the same.

Union Producing Co.'s No. 6 Ray is adding to the knowledge of geology of that region but not much to the production. It is nearly 3 miles north of No. 5 and is about 1,200 feet east of No. 2 which is a gas well at 2,890 feet. No. 6 Ray failed to get the 2,890-foot gas sand. On a drill stem test of sand at 4,148-57 feet it tested 60 feet of oil and 1,400 feet of salt water. At 4,425 feet it tested a few gallons of oil and is now a little deeper and drilling.

Up and down the country around Pettus there is a lot of activity and new tests started and new deals being pulled off. Ed Price has leased the Weiss ranch southwest of Pettus. Morgan Oil Corp. (William F. Morgan) is ready to spud in on his No. 1 Ray on a 2,000-acre lease north of Pettus. Houston Oil Co. has a rig up for another test on the McKinney land. Houston Oil has the gas lease only. No. 1 McKinney, having been completed as an oil well, has been turned over to the Humble Oil & Refining Co. which holds the original lease and the new test will be called the Houston Oil Co.'s No. 1 McKinney again.

Darst Creek Field

Darst Creek Field in Guadalupe County the past week added some more big producers. Sun Oil Co.'s No. 4 Knoblock at 2,547 feet came in for 4,500 bbls., one of the biggest in the field. The Texas Company's No. 1-A Knoblock came in for 1,475 bbls. and the Humble Oil & Refining Co.'s No. 5 Sallie Wilson at 2,644 feet for a small producer. It is in the south part of the field.

The Humble Oil & Refining Co.'s No. 3 Dowdy in the southwest end of the field tested sulphur water and is a failure. This southwest end of the field is interesting and will be watched closely. A map made with the use of geophysics would indicate the field does not extend to the river. Some geologists, however, still believe that it extends beyond the river. No. 3 Dowdy making sulphur water does not entirely settle the matter as it may be a little too far to the west rather than south.

Williamson County

Eighteen derricks were up and three new wells near completion in Williamson County where E. L. Chapman recently opened a new pool in the southeastern part of the county. The field has made more rapid progress since the completion of the discovery well than any other field in this part of Texas. It is almost entirely an independent operators' deal with lease blocks relatively small. Chapman's No. 1 Fuch, a south offset to his discovery well, is down below 1,500 feet, Simms Oil Co.'s No. 1 Laurence below 1,200 feet and Sconyers-Edwards' No. 1 Abbott below 1,500 feet. These three are all close in and will be in the sand early this week as the discovery well is producing at around 1,900 feet. Proration has not been discussed in the field as yet and no move made in that direction.

COMPLETIONS

Darst Creek—Guadalupe County

Humble Oil & Refining Co.'s No. 9-A Denman, 915 feet east of No. 7, 800 feet from south line, in the A. S. Emmett Survey; total depth 2,604 feet; flowing 600 bbls.

Magnolia Petroleum Co.'s No. 2 Rand Miller, 450 feet from northeast line, 150 feet from northwest line of tract, in the J. R. Alexander Survey; total depth 2,629 feet; 500 bbls.

Gulf Production Co.'s No. 1 Knoblock, in the J. R. Robinson Survey; total depth 2,540 feet; flowing 9,000 bbls. Same company's No. 3 Dix-McKean, 150 feet south of center of the north line of tract, in the J. R. Robinson Survey; total depth 2,564 feet; flowed 984 bbls.

Magnolia Petroleum Co.'s No. 6 Thomas Dix, 473 feet southwest line, 150 feet northwest line of tract, offset to Gulf's No. 2 Thomas Dix, in the J. R. Robinson Survey; total depth 2,584 feet; flowing 93 bbls. per hour. Same company's No. 1 Annie Knodel, 150 feet each way out of northwest corner, in the J. R. Robinson Survey; total depth 2,578 feet; flowing 83 bbls. per hour.

The Texas Company's No. 5 Dallas Wilson, 150 feet from north and east lines of the Dallas Wilson tract, in the Jacob C. Darst Survey; total depth 2,619 feet; flowing 335 bbls. per day. Same company's No. 2-B Knoblock, 450 feet from northeast line, 150 feet from northwest line of B lease, in the J. R. Robinson Survey; total depth 2,559 feet; flowing 35 bbls. per hour. Same company's No. 3 P. Roamel, 150 feet each way from southeast corner of tract, in the J. R. Robinson Survey; total depth 2,596 feet; pumped 200 bbls.

ABANDONED TESTS

Darst Creek—Guadalupe County

Magnolia Petroleum Co.'s No. 1 S. M. Roamel, 150 feet each way from southeast corner of 40-acre tract, in the James Hodges Survey; total depth 3,670 feet; dry and abandoned.

Agua Dulce Pool—Nueces County

Allied Gas Co.'s No. 1 Warren Chapman, 660 feet from the most northern and the western east line of said tract south of Kerr lease; total depth 2,504 feet; abandoned; dry.

Jennings Pool—Zapata County

O. W. Killam's No. 2 F. G. Martinez, 543 feet west line, 150 feet south line of SE, Survey 2; total depth 1,953 feet; oil sand 1,946-53 feet; tested oil and salt water; abandoned; flowed hot salt water.

Production

Daily average production of the pools in this area during the past week follows:

SOUTHWEST TEXAS

Branyon	25
Buchanan	34
Bruner	25,007
Dale	372
Darst Creek	14,441
Kingsville	118
Larremore	95
Luling	9,815
Lytton Springs	891
Manford	545
McMullen County	35
Medina County	22
Mirando	8,974
Somerset	1,644
Star County	26
Yoast	750
Total Southwest Texas	62,794
Week ending February 22	63,924
Decrease	1,130

NEW LOCATIONS

Darst Creek—Guadalupe County

Empire Gas & Fuel Co.'s No. 1 Knoblock, 150 feet northeast and southeast lines of 40-acre tract, in the J. R. Robinson Survey; moving in.

Humble Oil & Refining Co.'s No. 4 D. D. Baker, 700 feet from east line, 550 feet from north line of tract, in the J. C. Darst Survey; location.

The Texas Company's No. 4-B Knoblock, rigging up. Same company's No. 5-B Knoblock, moving in. Same company's No. 6-B Knoblock, building derrick. Same company's No. 2-A Knoblock, building derrick. Same company's No. 3-A Knoblock, moving in. Same company's No. 4-A Knoblock, moving in.

Trinity Drillers' No. 1 I. L. White, 1,398 feet from north line, 750 feet from east line, in the M. Miller Survey; location.

Albercas Pool—Webb County

O. W. Killam's No. 1 Bruni, 575 feet north line, 238 feet east line, Block 33, Albercas grant; rigging up.

Jennings' Pool—Zapata County

Livingston & Twiss' No. 1 Trevino, 150 feet north line, 150 feet west line, Block 7, Survey 66; location.

Cole Pool—Duval County

Cole Petroleum Co.'s No. 68 Rosa Benavides, 660 feet northeast line, 660 feet northwest line, Cole subdivision, Mariano Arispe grant, Block 11, Survey 1; rigging up.

Kohler Pool—Duval County

Humble Oil & Refining Co.'s No. 43 Kohler, 825 feet north line, 165 feet west line, Survey 169; rigging up.

DRILLING ACTIVITY

Darst Creek—Guadalupe County

J. S. Abercrombie's No. 4 Thomas Dix, 300 feet north of No. 1, in the J. R. Robinson Survey; location. J. S. Abercrombie's No. 5 Thomas Dix, 300 feet north of No. 3, in the J. R. Robinson Survey; location.

J. S. Abercrombie and Harris Oil Co.'s No. 6 Thomas Dix, 300 feet north of No. 2, in the J. R. Robinson Survey; location.

Gulf Production Co.'s No. 5 Dix-McKean, 162 feet from east line, 150 feet

(Continued on Page 226)

WILDCAT OPERATIONS IN SOUTHWEST TEXAS

Company, farm and location—	Remarks:
ATASCOSA COUNTY	
Frontier Oil Co.'s No. 1 Hoffman, 2,122 ft. from E line, 1,550 ft. S line of tract in the John Sharp Sur., 3 miles SW from Somerset Field	T. D. 1,632 ft. in shale; light oil show at 1,390-99 ft.
BASTROP COUNTY	
H. C. Kate et al's No. 1 C. L. Lackey, 5,150 ft. NW line, 1,500 ft. SW line of 219-ac. tract in the Joshua Gray Sur., 2 miles W from Bateman	Rigging up.
B. L. Batts et al's No. 1 A. A. Alexander, W. M. Eastland Sur., 4,190 ft. to NW line, 1,320 ft. to SW line of Sur.	T. D. 1,420 ft.; drlg. in shale.
Jim Harper's No. 1 Mitchell, 150 ft. from SE cor. Blk. 111, Bastrop Townsite	Derrick.
Abernathy et al's No. 1 A. Aldridge, in the Martha Barker Sur., 2,750 ft. SE and 450 ft. NE of 241-ac. tract or 2,000 ft. SW and 4,500 ft. NW of Sur.	T. D. 2,200 ft.; drlg. in chalk.
Superior Oil Co.'s No. 1 A. Lasher, D. Dykes Sur., 600 ft. to S and W lines of Sur.	T. D. 400 ft.; drlg. in sand and shale.
BEE COUNTY	
The Texas Company's No. 1 Lasater (core test), 980 ft. N, 20 ft. E from SW cor. of Lasater 170-ac. tract (shown as Hill tract on map), thence 2,100 ft. S, 70 ft. E Jose Maria Uranga Sur.	T. D. 810 ft.; drlg. in shale.
Morgan Oil Corp.'s No. 1 Mrs. R. A. McKinney, 350 ft. N of S line, 2,640 ft. W of E line of Mrs. R. A. McKinney tract in the Ryland C. Ballard Sur.	Derrick up; rigging up.
Ed Price's No. 1 Mrs. Laura E. Weiss, 200 ft. out of NW cor. of B.&B. 640-ac. Sur., E of Normanna, 6 miles W of Blanco Creek in the B.&B. Sur.	Derrick.
Houston Oil Co.'s No. 1 J. F. Portis 288.3-ac., 1 mile SW of No. 1 McKinney, in the A. Smalley Sur.	Ready to spud.
Dr. Bozo & Cooper's No. 1 A. J. Kimbell, C 189 acres in the Stephen Winship Sur.	Standing.
Morgan Oil Corp.'s No. 1 Geo. A. Ray, 2 miles SW of No. 1 McKinney, NW Medio Creek, NE part Geo. Ray 936-ac. tract in the John W. Williamson Sur.	T. D. 2,415 ft.; drlg. in shale.
The Texas Company's No. 3 Tipps	T. D. 2,230 ft.; drlg. in sandy shale.
BEXAR COUNTY	
Burton Oil Co.'s No. 1 P. H. Shook, in the Monjares Sur., 3,150 ft. to E line, 150 ft. to N line of farm, 10 miles SE from San Antonio	T. D. 1,626 ft.; drlg. in shale.
H. H. Wallace et al's No. 2 Dulnig in the Justo Esqueda Sur., 5 miles SE from San Antonio	T. D. 1,515 ft.; shut down.
Moore-Jauer's No. 1 Holly R. Ellison	T. D. 1,980 ft.; working to shut off water.
BROOKS COUNTY	
Amos Dinn, trustee's No. 3 Garcia-Ramos, Share B-1, Las Mestenas y Gonzales grant, 1,300 ft. S line, 2,325 ft. W line of Share B-1	T. D. 1,655 ft.; standing.
Humble Oil & Ref. Co. and Shell Pet. Corp.'s No. 1 Singer, Alta Verde Subd., 2,500 ft. S and N line, 333 ft. W and E line of Section 312	T. D. 2,614 ft.; drlg. in gumbo.

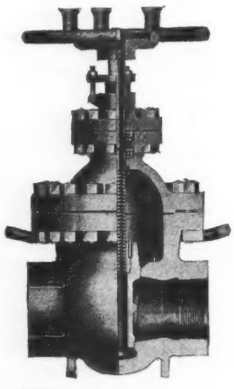
ANNOUNCEMENT

WE are pleased to announce the appointment of the Taubman Supply Corporation of Tulsa, Oklahoma, as our factory representative for the Mid-Continent Field, exclusive of the Gulf Coast district. A large and complete line of Chapman valves is being carried in Tulsa, Oklahoma City and Houston, in addition to prompt factory shipment.

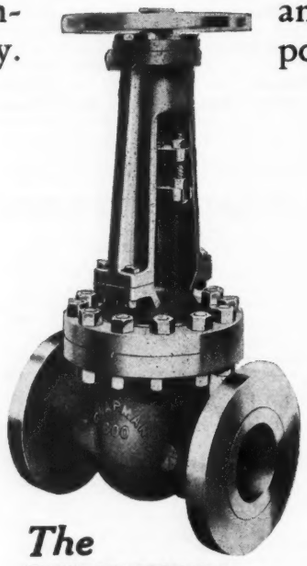
In line with the Chapman expansion program of manufacturing capacity, and to better serve the oil and gas industry, and after carefully checking ways and means of furthering our services in the Mid-Continent Field, we have found that the Taubman Supply Corporation has proven itself the livest and most dependable organization to represent us in this territory.

Taubman Supply Corporation will carry a large and complete stock of brass, iron, and steel, standard and high pressure valves for every branch of the oil and gas industry. Our arrangement with the Taubman Supply Corporation will not penalize the oil and gas industry. Their prices will be the same as those of our factory branches.

Our factory engineer, Mr. James B. Ford, representing us in the Mid-Continent Field, the past three and one-half years, as district manager, will continue serving this territory with the Taubman Supply Corporation in the capacity of Consulting Engineer. Do not hesitate to submit your problems. We are always willing and ready to assist you in every way possible.



The DRILLING VALVE



The REFINERY VALVE

The PIPE LINE VALVE

The Chapman Valve Manufacturing Co.
Indian Orchard, Mass.

Chapman Valves for Oil Service Carried in Stock
Los Angeles—2314 East Eighth St.
San Francisco—525 Fourth Street
Tulsa—115 West First St.
Houston — 2103 Esperson Bldg.

Other Branch Offices
Pittsburgh Detroit
Atlanta Philadelphia Chicago
Syracuse New York Boston

Mid-Continent Factory Representative:
TAUBMAN SUPPLY CORPORATION
General Offices: Tulsa, Oklahoma

An Announcement of importance to the entire OIL & GAS INDUSTRY

WE are pleased to announce our appointment as factory representatives in the Mid-Continent for

CHAPMAN VALVES

Known Wherever Good Valves Are Necessary

We have found it necessary to have a complete line of valves to further Taubman facilities for better serving the Petroleum Industry with Quality, Quantity and Service.

After a thorough investigation of actual performance in the field and a personal inspection of the factory at Indian Orchard, Mass., by our president, Mr. Herman P. Taubman, in company with one of the Petroleum Industry's most competent engineers, we found Chapman Valves are made in one of the largest, best equipped and up-to-date valve, steel, iron and brass foundries and finishing plants in the country. We are therefore fully and conclusively convinced that we are offering the Oil and Gas Industry the utmost in valve quality which measures up to the highest manufacturing standards.

We will be glad to receive inquiries for your requirements and can assure you our continued high standard of service from our large and complete stocks at Tulsa, Oklahoma City and Houston.

TAUBMAN SUPPLY CORPORATION

General Offices: Midco Building
TULSA, OKLAHOMA

OKLAHOMA CITY HOUSTON

New Production Peak on Gulf Coast

New Flush Production at Humble, Refugio, Port Neches and Sulphur Responsible. Wildcat at Refugio Opens Deeper Sand

By Neil Williams
Staff Correspondent, Gulf Coast Fields

HOUSTON, Tex., Mar. 3.—New flush production at Humble, Refugio, Port Neches and Sulphur was largely responsible for an increase of 6,708 bbls. in the daily average output of the Gulf Coast for the past week. This set a new peak of 204,397 bbls. daily, surpassing the coast's previous high mark in production of 203,416 bbls. made during the week ended February 8. A 5,000-bbl. well at Humble and another at Sulphur late the preceding week resulted in substantial gains for these fields and good completions were made in several other fields, chiefly Refugio and Port Neches.

At Refugio, Houston Gulf Gas Co.'s No. 1 M. F. Lambert, deep sand wildcat 2 miles northeast of production which was completed early in the week flowing 300 bbls. daily, late in the week had increased to 1,350 bbls. daily after enlarging the choke from three-sixteenths-inch to seven-sixteenths-inch. This well, which not only extended the field but also opened a new deep sand at 5,879-84 feet, was the most important development at Refugio since the finding of the first deep sand at 5,400-5,500 feet east of the original field several months ago. The successful completion of this well was further indication that Refugio is one of the greatest potential producing areas of Texas even without additional eastward extensions. However, another wildcat still further east by several hundred feet already is drilling, this being No. 2 Lambert, which at latest report was drilling below 2,900 feet.

Big Well at Humble

The big well at Humble was The Texas Company's No. 36 Koehler on the northeast side of the dome, which well, with 400 feet of 4¾-inch screen set in the hole at 4,777 feet, flowed 1,432 bbls. of pipe line oil in the first six hours on a five-eighths-inch choke. The well was estimated good for 5,000 bbls. and Saturday still was flowing at this same rate. The oil is 36.7 gravity. Although in an old producing area this well opens a deeper sand as the lowest previous production has been obtained at 4,000 feet with the bulk from 3,100-3,400 feet.

Union Sulphur Co. also swelled its daily production at Sulphur Dome in Calcasieu Parish, Louisiana, with the completion of No. 756 fee, one of the best wells ever completed in that field. This well came in flowing an estimated 4,900 bbls. daily on a three-quarters-inch choke from sandy shale at 4,773 feet.

Sheeks-Esperson Dome

Producing limits of the new Sheeks or Esperson Field of western Liberty County, were pushed several hundred feet to the west and north by Cranfill-Reynolds Oil Co.'s No. 2 Davis which was brought in flowing 350 bbls. daily of pipe line oil with two joints of screen set at 2,304 feet. This is the eighth successful well in this area all of which are producing from approximately the same sand depth except the discovery well, Yount Lee Oil Co.'s No. 1 Moores Bluff, which is in a deeper sand.

This area, which generally had been condemned until the past year, now is paying off in 2,300-foot wells, producing good Grade A oil. The area is especially promising in view of the fact that there are several shallower sands which have been passed up by these tests and also because of possible deeper development. Although several deep tests have been drilled they are in a different section of the field from the present main 2,300-foot producing area.

The Texas Company's No. 2 Pipkin, at Big Hill, Jefferson County, late in the week still was blowing as a gas well from the 6,010-foot level in shale. As the well now stands it is only another teaser for continued attempts to find production at this dome. Drilling at Big Hill, one of the older Coastal domes, although still unproductive commercially in the past, has encountered gas pockets and good showings of oil and at one time a short-lived well was completed, but these always have been only a stimulus for operators to keep up their intermittent wildcatting.

Near Port Neches

Following the completion earlier in the week of its fourth successive producer in its new field in southwestern Orange County, near Port Neches, The Texas Company has made two more locations, one on the Kuhn tract, on which the discovery well was completed, and the other on the Stark tract, at the intersection of which tracts with the Polk tract the new field is being developed. The Texas Company so far has an unbroken record in this field, which is being developed on a consistent and conservative basis. The latest well was completed on February 24 and flowed 1,317 bbls. of pipe line oil on a five-eighths-inch choke the first 24 hours. Two joints of screen were set at a total depth of 3,150 feet at which horizon the other three wells are producing.

Refugio Completions

Completions at Refugio during the week included Union Producing Co.'s No. 2 J. F. B. Heard, on the far southeastern edge of the 3,700-foot field. This well, in sand at 3,663-68 feet, is flowing an estimated 450 to 500 bbls. of pipe line oil daily on a quarter-inch choke. Edwin M. Jones also got a good well in his No. 1-A Leisering, Block 49, of the town lots, which is flowing 350 bbls. of pipe line oil at 3,681-85 feet, Houston Oil Co.'s No. 1 Rooke Hotel, in the adjoining lot, Block 48, was completed flowing 1,000 bbls. of fluid, 50 per cent oil, on a 2-inch open line, at 3,683-91 feet. Morgan Oil Corp.'s No. 1 Hornburg, Block 32, was abandoned at 3,719 feet after testing salt water. Independent Oil & Gas Co.'s No. 6 Reilly, Lot 2, Block 4, flowed 50 bbls. daily at 3,683 feet.

Barbers Hill

Two small deep wells were completed at Barbers Hill, these being Sinclair Oil & Gas Co.'s No. 3 Wilburn, flowing 200 bbls. at 5,261 feet, and Humphreys Corp.'s No. 2 Ilfrey, 275 bbls. at 5,087 feet. The latter has been interesting as it is producing under the salt. This is the test which drilled through 878 feet of salt at 1,531-2,409 feet and back into formation again. This is not the first time a test has drilled through salt but on previous occasions the salt consisted only of comparatively thin fingers.

On the southeast side of the Barbers Hill Dome, Mills Bennett Production Co. has taken over for development two tracts, totaling approximately 40 acres, owned in fee by the Gulf Production Co. Drilling already has started on one, the Higgins tract. The property, which lies directly between Mills Bennett Production Co.'s Collier lease and Yount Lee Oil Co.'s production on the south side of the dome, will be drilled on a 50-50 basis.

Other completions of the week included Rio Bravo Oil Co.'s No. 17-A Settegast, Pierce Junction, 150 bbls. of fluid, 10 per cent salt water, 3,594 feet; Humble Oil & Refining Co.'s No. 3-B Sugarland, DeWalt, 750 bbls., 3,784 feet, and Humble Oil & Refining Co. and Valley Oil Corp.'s No. 5 Woodley, Raccoon Bend, 470 bbls., 3,446 feet.

San Felipe Dome

On the San Felipe Dome, Kirby Petroleum Co.'s No. 1 Davis, William Cooper Survey, Waller County, blew out Saturday and late in the day was still blowing wild with the derrick wrecked. The gas is blowing from around the outside of the 12½-inch string of casing. Total depth of the hole is 2,941 feet. San Felipe, so far unproductive, has experienced several blowouts and all the wildcats there have encountered good looking showings although all tested salt water or sulphur water.

This makes two wild gassers on the Gulf Coast. At Refugio, Union Producing Co.'s No. 2 Ben Shelton, which blew out over a week ago around 5,800 feet, is still out of control. The latter well, which has a high pressure, probably will be lost as it is not likely that it can be killed without it sanding up. The well is getting further out of control with the hole beginning to cave.

Buffalo Oil Co. has abandoned its No. 1 Beall, a wildcat in the John Flowers Survey at Eureka, just northwest of Houston. This test, the first drilled on what was indicated as a new salt dome prospect, failed to give any indication of a dome and was quit in gumbo and lime at 4,662 feet. Also in Harris County, Cranfill-Reynolds Oil Co. abandoned its No. 1 Brown at Wooster, quitting in water sand at 6,124 feet. The latter test was drilled to 1,910 feet by Paxton & Pundt and taken over by Cranfill-Reynolds Oil Co. during the latter part of 1929.

Daily Average Production

Daily average production of Coastal fields for the week ending March 1 was:

SOUTHEAST TEXAS

Allen	126
Barbers Hill	23,989
Batson	1,192
Big Creek	3,124
Blue Ridge	1,935
Brenham	135
Boling	1,056
Clay Creek	1,485
Damon Mound	560
DeWalt	12,228
Fannett	1,028
Goose Creek	4,853
High Island	1,219
Hull	9,239
Humble	17,560
Jasper County	25
Lost Lake	975
Markham	315
Nash	385
North Dayton	1,082
Orange	2,561
Orchard	68
Pierce Junction	11,285
Port Neches	2,190
Raccoon Bend	11,807
Refugio	37,304
Sheeks	725
Saratoga	1,002
Sour Lake	2,342
So. Liberty-So. Dayton	5,468
Spindletop	17,836
West Columbia	6,052
Total Southeast Texas	181,151
Week ending February 22	176,934
Increase	4,217

SOUTH LOUISIANA

Anse La Butte	46
Bayou Blue	104
Bayou Bouillon	32
Black Bayou	120
Caillou Island	48
Edgerly	650
Jennings	1,091
Hackberry	2,618
Lake Barre	232
Lake Pelto	204
Lockport	2,858
New Iberia	6
Port Barre	2,963
Sorrento	96
Starks	436
Sulphur	6,700
Sweet Lake	20
Vinton	3,949
Welsh	195
White Castle	379
Total South Louisiana	22,746
Week ending February 22	20,755
Increase	1,991
Total Gulf Coast	203,897
Week ending February 22	197,689
Increase	6,208

GULF COAST FIELDS AND WILDCATS

Week Ended March 1

BARBERS HILL—CHAMBERS COUNTY

Mills Bennett Production Co.'s No. 2 Barber, north side	Drlg. plug 6,345 ft.
Mills Bennett Production Co.'s No. 7 Barrow, north	Drlg. sandy shale 5,115 ft.
Mills Bennett Production Co.'s No. 3 J. F. Wilburn, southeast	Drlg. lime 4,791 ft.
Mills Bennett Production Co.'s No. 3 Collier	Drlg. shale 3,851 ft.
Mills Bennett Co.'s No. 1 Gulf fee	Set surface casing 1,250 ft.
Gulf Production Co.'s No. 2-A Wilburn, southeast	Drlg. sand and lime 3,742 ft.
Humphreys Corp.'s No. 1-F Barber, northwest	Drlg. hard sandy lime 2,912 ft.
Humphreys Corp.'s No. 2-C Kirby	Drlg. shale and lime 2,561 ft.
Humphreys Corp.'s No. 1 McLean, east side	Drlg. hard sand 6,002 ft.
Humphreys Corp.'s No. 2 Ilfrey, east side	Comp. flowing 275 bbls. pipe line oil on half inch choke 5,087 ft.
Humphreys Corp.'s No. 1 Morgan	Drlg. hard sand and lime 3,370 ft.
McAlbert Oil Co.'s No. 1 Higgins	Drlg. gumbo 1,755 ft.
Sinclair Oil & Gas Co.'s No. 3 McKinney fee	Derrick.
Sinclair Oil & Gas Co.'s No. 3 Wilburn, southeast	Comp. flowing 200 bbls. oil 5,261 ft.
Sinclair Oil & Gas Co.'s No. 4 Wilburn, southeast	Drlg. sand showing oil 5,093 ft.
Sinclair Oil & Gas Co.'s No. 5 Wilburn, southeast	Drlg. gumbo 2,724 ft.
Sun Oil Co.'s No. 4 McKinney fee	Derrick.
Sun Oil Co.'s No. 4 Wilburn, southeast	Drlg. sand and lime 4,903 ft.
Sun Oil Co.'s No. 2 J. Wilburn, southeast	Drlg sand and shale showing oil 5,349 ft.
Sun Oil Co.'s No. 3 J. Wilburn, southeast	Drlg. sand rock 4,175 ft.
Sun Oil Co.'s No. 4 J. Wilburn, southeast	Drlg. gumbo and lime 3,858 ft.
Sun Oil Co.'s No. 4 Chambers, south	Cemented casing to test 5,291 ft.
The Texas Company's No. 1 Lawrence	Drlg. shale and lime 5,475 ft.
Unice Oil Co.'s No. 2 Feldman, east	Set 4 joints screen 5,162 ft.; testing.
Yount Lee Oil Co.'s No. 11 Chambers, south	Rigging up to pump 5,550 ft.
Yount Lee Oil Co.'s No. 13 Chambers, south	Drlg. hard sand and lime 2,026 ft.
Yount Lee Oil Co.'s No. 3 Phillips, southeast	Drlg. gumbo 1,075 ft.
Yount Lee Oil Co.'s No. 6 Woodward, southeast	Rig.
Yount Lee Oil Co.'s No. 1 Zadie Fisher, southeast	Drlg. shale 5,280 ft.

BOLING—FORT BEND AND WHARTON

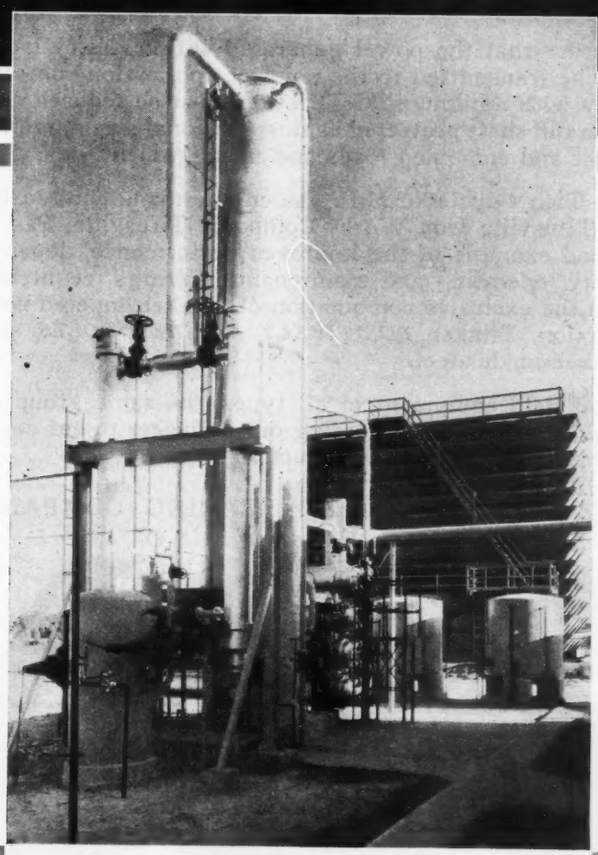
Houston Gulf Gas Co.'s No. 1 Fields, northwest	Fishing drill stem 4,500 ft.

RACCOON BEND—AUSTIN COUNTY

Humble Oil & Ref. Co.'s No. 8-B Deutrich	Drlg. shale, sand and shell 3,180 ft.
Humble & Valley's No. 9-A Deutrich	Shut down 3,200 ft.
Humble & Valley's No. 1 Duncan, State land	Drlg. shale 3,183 ft.
Humble & Valley's No. 6 Gotosky	Shut down 3,177 ft.
Humble & Valley's No. 3 Helmuth	Cemented casing 1,190 ft.
Humble & Valley's No. 1-B Machamehl	Shut down 3,602 ft.
Humble & Valley's No. 1-C Mitchell	Location.
Humble & Valley's No. 6 Mueller	Rigging up to pump 3,270 ft.
Humble & Valley's No. 6 Thompson	Cemented casing 1,190 ft.

(Continued on Page 221)

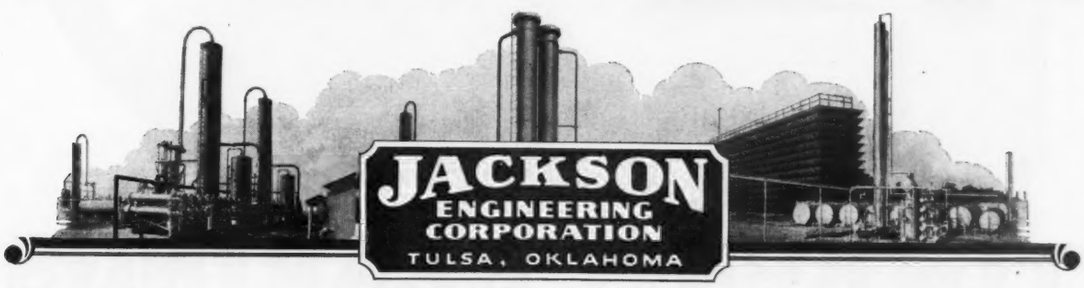
Balanced VAPOR RECOVERY SYSTEMS



- DEBUTANIZERS
- ABSORPTION PLANTS
- FRACTIONATING UNITS
- SPECIAL PROCESSES

DESIGNED for Refinery conditions with units correlated to meet changing requirements.

Analysis Surveys . . . Bubble Towers
Heat Exchangers . . Cooling Towers



NEW YORK HOUSTON DALLAS LOS ANGELES

"Tico" Gas Engines Have Timken-Equipped Crank Shafts

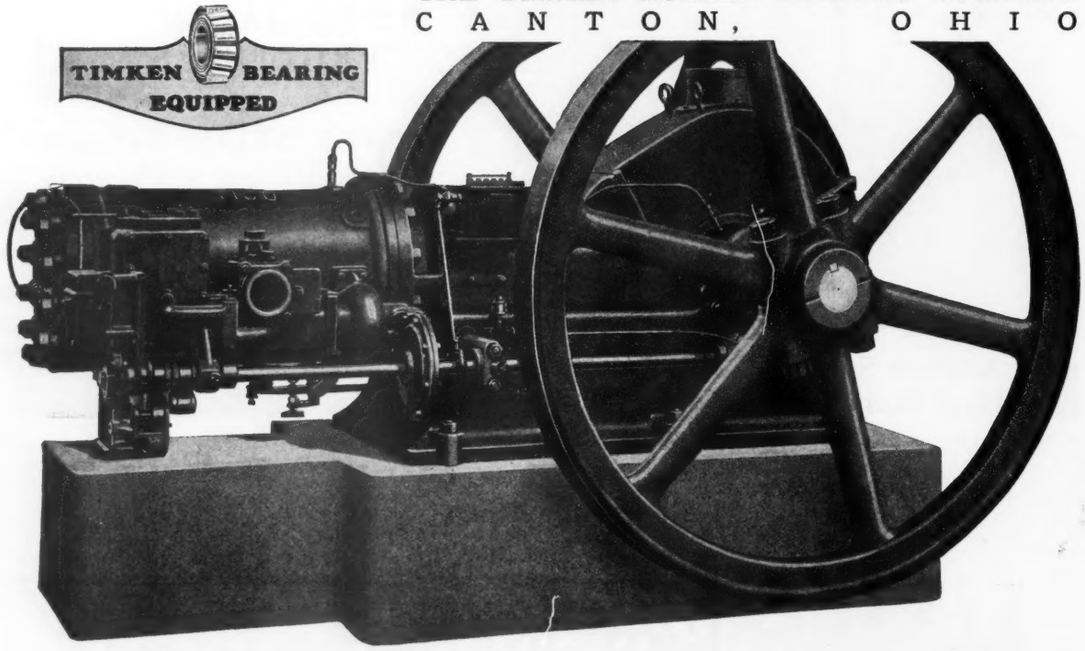
Everything else being equal, the question of efficiency and continuity in gas engine performance centers on the crank shaft.

In order that the power generated within the cylinder may be transmitted to the point of application continuously with minimum loss, friction must be reduced and the crank shaft protected against torsional strain, radial, thrust and combined loads and misalignment.

The Tico 4-cycle 40 H.P. gas engine manufactured by the Titusville Iron Works Company, Titusville, Pa., is a good example of the improved performance, dependability, operating and maintenance savings, resulting from the exclusive combination of Timken tapered construction, Timken *POSITIVELY ALIGNED ROLLS* and Timken-made steel.

In oil field equipment of all types, the same group of Timken advantages is aiding oil producers to cut costs in every department of production.

THE TIMKEN ROLLER BEARING COMPANY
C A N T O N, O H I O



TIMKEN *Tapered Roller* **BEARINGS**

Hobbs Area Showing More Activity

Deep Test Being Drilled on Mahoney Dome, Wyoming, Reaches Lower Sand. Gas Blowout Reported in Idaho Wildcat

By Tolbert R. Ingram
Staff Correspondent, Rocky Mountain Area

DENVER, Colo., Mar. 3. — The Barnsdall Oil Corp.'s No. 1 Bronson, in northern Lea County, New Mexico, will be abandoned at 5,106 feet. The Hobbs area, between the Humble Oil & Refining Co.'s No. 1 Bowers and the group of producers to the southeast, is showing some activity with one well spudding, another location and with two more offsets to come. Snowden & McSweeny's No. 1 State, in the Lea Pool, swabbed 810 bbls. of oil and 45 bbls. of water in 24 hours and the Continental Oil Co.'s No. 2 State will make a small producer. The Texas Pacific Coal & Oil Co.'s No. 2 State, in the Cooper area, ran into more water and will be plugged back. The Magnolia Petroleum Co.'s offset to the Skelly well in the Jal Pool is flowing 220 bbls. a day by heads.

There were no completions or new wells started in either Utah or Colorado and operations revealed only routine progress.

A deep test being drilled on the Mahoney Dome, in Wyoming, by the Producers & Refiners Corp. has reached a sand below all horizons heretofore drilled.

A gas blowout in a wildcat being drilled in the town of Payette, Idaho, was reported, but the hole bridged and its importance is not known.

NEW MEXICO

Lea County, New Mexico, probably will have only one railroad instead of two as the Atchison, Topeka & Santa Fe has announced it will not build westward out of Texas to Lovington. Its application for a permit to build this line, which was intended to go on south through the oil fields, was limited by the Interstate Commerce Commission to a line to Lovington which is not acceptable to the company. The Texas-New Mexico line from the south to Lovington through Jal, Eunice and Hobbs is under construction by a subsidiary of the Texas & Pacific.

Lea County

Drilling operations in Lea County include the following:

Lovington Area

The Barnsdall Oil Corp.'s No. 1 Bronson, SE cor., Section 28-16-38, in the northern part of the county, is shut down at 5,106 feet and is preparing to plug to abandon. No important shows were reported. Its elevation is 3,711 feet. The salt was topped at 2,165 feet and the brown lime at 4,697 feet.

Tatum Area

A. D. Morton and others' No. 1 State, C NW, Section 32-11-38, also in the northern part of the county, is shut down at 4,004 feet in red rock, the contract depth having been reached.

Hobbs Area

One well abandoned, one well spudding and one new location summed up the week's developments. The Ohio Oil Co.'s No. 1 State-Northrup, NE NW SE, Section 32-18-38, to the northwest of the group of producers and midway between these and the Humble Oil & Refining Co.'s No. 1 Bowers, the record well for New Mexico, commenced spudding on February 19 and is drilling at 105 feet. The Shell Petroleum Corp.'s No. 1 State, SE SW NE, Section 32-18-38, an offset on the north to the Ohio's well, is digging cellar, drilling a water well and moving in rig. The footage is 2,310 feet from the north line and 1,650 feet from the east line. These two wells probably will result in at least two more offset locations. The Midwest Refining Co.'s No. 6 Wright, NW cor. SW, Section 14-19-38, which found the southern limits of the pool, is being abandoned at 4,500 feet, at which depth it had 3,500 feet of sulphur water in the hole. Fisher & Lowrie's No. 1 State, NE cor. NW, Section 11-18-36, 9 miles northwest of the Humble's No. 1 Bowers, is drilling at 2,101 feet in salt after standardizing. Cecil Bordages' No. 1 Hughes, C S half, Section 27-19-38, about 1½ miles south of the nearest producer, is resuming at 4,012 feet after being idle for some time. Titles have been adjusted. It has some collapsed 8¼-inch casing which will have to be cleared out.

Lea Area

Snowden & McSweeny's No. 1 State, NW cor. SW, Section 1-21-33, the most southerly of the wells recently drilled into the pay in the Lea Pool, is bottomed at 3,801 feet and running the 3-inch tubing. The well swabbed 810 bbls. of oil and 45 bbls. of water in 24 hours. The Continental Oil Co.'s No. 2 State, SW cor., Lot 12, Section 1-21-33, to the north of Snowden & McSweeny's well and on the southeastern side of the pool, was plugged back from 3,816 feet to 3,722 feet and given a small shot. It is making 7 bbls. per hour. Cranfill & Reynolds' No. 1-D State, SE cor., Lot 6, Section 3-21-33, on the west side, is drilling at 1,450 feet in the red beds.

Eunice Area

The Ohio Oil Co.'s No. 1 State-McDonald, SW NW SW, Section 15-22-36, is building rig, and the Continental Oil Co.'s No. 1 William Meyers, SW cor. NW, Section 28-22-36, is still drilling by tools at a total depth of 3,750 feet. The Empire Gas & Fuel Co.'s No. 1 Closson, NE NW SE, Section 6-22-36, is bottomed at 3,745 feet, where it was delayed by a fishing job, and is running 5⅜-inch pipe.

Cooper Area

The Texas Pacific Coal & Oil Co.'s No. 2 State, NW cor. SW, Section 21-23-36, which was drilled deeper only to run into water, is bottomed at 3,819 feet and flowing 278 bbls. of oil and 150 bbls. of water per day. It will be plugged back in an effort to shut off the water. The same company's No. 3 State, NW SW NW, Section 21-23-36, is drilling at 3,646 feet in brown lime and making approximately 15,000,000 feet of gas. The gas is coming from horizons at 3,420-22 and 3,467-95 feet. Cranfill & Reynolds' No. 1-C State, SW SE SW, Section 16-23-36, is drilling at 2,470 feet in salt.

Jal Area

The Magnolia Petroleum Co.'s No. 1-X Lindley, SE cor. NE, Section 26-25-36, an offset on the north to the Skelly Oil Co.'s No. 1 Joyner, is bottomed at 3,335 feet and flowing 220 bbls. per day by heads. The first oil was at 3,297 feet and increased at 3,312-35 feet. The Humble Oil & Refining Co.'s No. 1 Koonce, SE cor. NE, Section 14-25-36, is drilling in lime at 3,250 feet. It had a show of gas at 3,100 feet and shows of oil and gas at 3,302-12 feet. The Empire Gas & Fuel Co.'s No. 2 Lindley, NE cor. SE, Section 14-25-36, is drilling at 2,985 feet in lime. The Humble's No. 3-A Lindley, NW cor. SW, Section 13-25-36, has rig up.

Southwestern Area

The Rector Oil Co.'s No. 1 King, NE NE, Section 26-25-32, is shut down at 4,090 feet in salt. It topped the salt at 1,058 feet.

Eddy County

Flynn, Welch & Yates' No. 57 State, NE cor. SE, Section 19-19-28, Artesia area, is shut down for casing at 2,904 feet. It has 2,500 feet of sulphur water in the hole from 2,715-30 feet.

Maljamar Area

Naylor and others' No. 2 Danciger, NW cor. SW, Section 18-17-31, is bottomed at 3,600 feet and swabbing 70 bbls. of oil and 2½ bailers of water per day. Flynn, Welch & Yates' No. 2 Stevens, NW NE SW, Section 13-17-30, is drilling at 1,350 feet in lime and gypsum, and Leonard & Levers' No. 2 State, SE cor. NW, Section 21-17-29, is drilling at 1,150 feet in anhydrite and shale. It had shows of oil at 1,020 and 1,033 feet. Henderson, Dexter & Blair's No. 1 Grier, SW cor. NW, Section 21-16-31, is drilling at 760 feet in gypsum and salt. The salt was topped at 755 feet. The same firm's No. 1 Arnold, NE SE SE, Section 23-17-30, is drilling at 3,295 feet in gray lime.

Chaves County

The Cactus Petroleum Co.'s No. 1 State, SE cor., Section 14-10-26, is drilling at 1,885 feet in lime, and the Warman Oil Trust's No. 1 Seibert, SE NE, Section 27-13-24, is drilling at 1,095 feet in brown lime.

Sandoval County

The Virginia-Mex Oil & Gas Co.'s No. 1, NE SE, Section 23-20n-2w, is bottomed at 1,150 feet and fishing.

Valencia County

The Acme Development Co.'s No. 1 Santa Fe, Section 27-7n-4w, is drilling at 4,400 feet (corrected depth) without any more oil showing. This well is reported to have had gas in commercial quantities in an upper horizon.

San Juan County

The Southern Union Gas Co.'s No. 1-X Garland, NE NE, Section 11-28-11, Kutz Canon district, is spudding with rotary after skidding rig.

UTAH

The Utah Southern Oil Co.'s No. 1 State, SW SE, Section 26-21-23, Cisco district, in Grand County, is drilling at 206 feet, and the Midwest Refining Co.'s No. 31 Pary, SW SE, Section 14-39-1w, Kane County, is drilling at 1,965 feet in red shale.

COLORADO

There were neither any completions nor new wells started in Colorado during the past week and drilling operations were confined mostly to the routine. Citizens of Cortez, in Montezuma County, in the southwestern corner of the State, want a test drilled near that town and having given up hopes of outside interests putting down a hole, have taken matters in their own hands. A mass meeting of citizens has been called to talk over the situation and work out a financing plan. A test on the Cortez structure will reach the La Plata, or Sundance sand at 1,200 to 1,500 feet, according to their reports, and a rig and driller can be obtained in the county.

Huerfano County

The Parker Club, Inc., No. 1 Fee, Section 4-28s-68, Badito-Alamo structure, joint with the Kinney-Coastal Oil Co., is bottomed at 4,015 feet and has pulled the 5⅜-inch casing to straight-ream to the bottom so coring may go ahead in a 6-inch hole. This well had water in the Muddy sand, but upon passing out of same encountered a show of oil. The bottom is just a short distance off the Dakota sand and the favorable show of oil has encouraged the operators. Sporleder & Elliott's No. 1 Abeyta, SW cor. NW, Section 31-27-65, Cuchara structure, is bottomed at 1,500 feet where contract depth was reached. It has not reached the Dakota and a new contract to carry the hole down to the Sundance has been made.

Las Animas County

The Helium Co.'s No. 3 Morris-Cowdrey, SW cor. NW, Section 35-29-60, Model Dome, is drilling in white sand at 485 feet.

Fremont County

The Vogel-Raddatz Corp.'s No. 23 Travis, NE SW, Section 28-20-69, South Florence, is drilling at 2,300 feet. The Continental Oil Co.'s No. 2 Harding, NE SW, Section 21-18-70, Orchard Park, is drilling at 760 feet, and its No. 4

(Continued on Page 230)

NEW FIELD IN EASTERN ALBERTA ON ACADIA VALLEY STRUCTURE

By Victor Lauriston
Staff Correspondent, Canadian Fields

CHATHAM, Ontario, Mar. 1.—A new field is indicated for eastern Alberta by the report that Fuego Oils' No. 1, Section 34-25-4w4, has a commercial production, around 60 bbls. a day, from a depth of 3,210 feet. Fuego Oils' No. 1 is a wildcat test started several years ago on the Acadia Valley structure southeast of Oyen, and fairly close to the Alberta-Saskatchewan boundary.

Last year oil showings were reported around 3,100 feet. The well was deepened, and a lighter crude was encountered at 3,136 feet with apparently some gas flow. Water came into the hole beneath the 6-inch casing. It was claimed the suction from the gas flow drew the water into the hole from outside the casing. At that time the well was reported flowing by heads at 30-minute intervals, throwing out considerable quantities of an emulsion of oil and water. The well was swabbed, cleaned out and cemented and eventually the water was shut off; and drilling continued to the lower sand. Production is being taken between the 6½-inch and 4¾-inch casing, with 1,000 feet of oil reported standing inside the smaller string. Gas from the well has been used for some time as fuel for drilling. Fuego's No. 2 was located last year to spud in this spring. Fuego Oil Co. was incorporated some years ago under Dominion charter with office at Toronto. Officers are: president, E. G. Low; vice president, Dr. H. B. Minor; secretary-treasurer, Mrs. Margaret McGregor; assistant secretary treasurer, Robert Campbell; managing director, A. O. McArthur; directors, George Willocks, Miss A. C. McPhail. The company holds 10,000 acres on the Acadia Valley structure, which is a link between the Montana, Medicine Hat and Bow Island Fields to the south and the Wainwright and Ribstone Fields of east central Alberta, to the north. If the well holds up under a production test, extensive development work may be undertaken this spring in the Oyen area.

Damage in Turner Valley

High winds sweeping Turner Valley last week wrecked or seriously damaged a dozen derricks in the central and southern fields. Royalite Oil Co. lost heavily, derricks on five producing wells in the central field, Nos. 8, 9, 10, 17 and 21, being laid flat. Royalite's No. 21 has

(Continued on Page 227)

California's Revised Plan in Force

New Program for Curtailing Production to Run for Indefinite Length of Time in Contrast With Previous Restrictions

By L. P. Stockman
Staff Correspondent, California Fields

LOS ANGELES, Calif., Mar. 1.—California's revised curtailment plan, which contemplates the reduction of state oil production to approximately 609,000 bbls. per day, became effective this morning and the general executive committee hopes to have production down to the allotted maximum within the next few days. The present curtailment program will run for an indefinite period of time, in contrast with previous similar restrictions, as the agreement between operators designates the operating period as 90 days, or longer if conditions are still unsettled at the end of that period.

Several independent operators have steadfastly refused to sign the curtailment agreement or reduce production in compliance with the crude oil curtailment plan but their refusal is not expected to jeopardize the success of conservation work as the major companies have assured other independents that they will absorb the excess of those who have refused to lend their assistance.

In order to keep production under control, the operators' general committee will meet on the tenth of each month to review accomplishments during the preceding 30 days and to adjust any inequities. The responsibilities of Umpires Anderson and Grimm have been lessened somewhat and, while they will be in direct supervision of future curtailment, the various fields of the State have been assigned to individual members of the general operating committee who will be directly responsible for the success or failure of curtailment work in the particular areas assigned to them.

Individual Assignments

H. R. Macmillan has been charged with the responsibility of whipping Santa Fe Springs into line, while at Long Beach, A. T. Jergins will assume a similar responsibility. W. C. McDuffie of the Pacific Western Oil Co. is the counsellor for the Elwood Field, J. A. Brown for Ventura Avenue, A. H. Bell of the Continental Oil Co. for Seal Beach, R. A. Sperry of the General Petroleum for the Kern River front, while S. B. Mosher is chairman of the Maricopa flats section of the Midway-Sunset Field.

Reports of the various field chairmen to the general committee have been encouraging and it is hoped that their expectations will be entirely realized. The situation is still critical, notwithstanding the assurance that complete co-operation will be obtained, and will continue threatening until such time as State production is actually brought down to the allotted maximum. The heavy accumulation of crude and refined oil stocks during January is ample evidence that pipe line companies cannot cope with excess production, especially in view of the fact that storage facilities are almost exhausted. If operators succeed in reducing State production to current requirements the price structure of crude and refined oils can be maintained.

The present curtailment program is generally recognized as a last attempt to prevent a complete breakdown in California. If it fails its friends declare it will be because some operators have not met their moral obligation to co-operate with their neighbors. It is declared to be absolutely necessary therefore that every operator be square with the various umpires, who at best have a difficult undertaking. The next 30 days should determine definitely the outcome of present curtailment work, although production figures during the next few weeks will indicate the general trend.

TANKER SHIPMENTS FROM LOS ANGELES TO ATLANTIC AND GULF COAST PORTS

Commodity—	Total this week	Daily average	Total last week	Daily average	This year to date	Same time last week
Crude oil	.....	.....	77,405	11,058	77,405	110,550
Fuel oil	.....	.....	.....	.....	71,950	.....
Diesel and gas oil	153,418	21,917	116,036	16,577	629,315	389,566
Gasoline	351,229	50,176	151,314	21,616	2,805,459	3,214,580
Coastwise—						
Crude oil	117,909	16,844	404,796	57,828	2,260,150	4,544,741
Fuel oil	299,588	42,798	309,335	44,191	2,627,839	3,160,704
Diesel and gas oil	109,356	15,622	5,341	763	337,485	97,959
Gasoline	30,585	4,369	239,398	34,200	1,540,888	1,800,189
Kerosene	6,919	988	.....	.....	14,043	1,833
Expor.s—						
Crude oil	64,879	9,268	250,553	35,793	1,105,272	522,636
Fuel oil	223,420	31,917	413,687	59,098	2,364,257	2,936,219
Diesel and gas oil	217,948	31,135	66,194	9,456	878,822	397,413
Gasoline	165,421	23,632	217,703	31,100	2,289,463	1,454,569
Kerosene	87,866	12,552	102,245	14,606	411,229	397,600
Lubricants	.....	.....	5,057	722	5,057	.....

TANKER SHIPMENTS FROM SAN FRANCISCO TO ATLANTIC, GULF COAST PORTS

Diesel and gas oil	.....	.....	11,050	1,579	88,280	.....
Gasoline	152,895	21,842	64,225	9,175	285,245	501,170
Coastwise—						
Fuel oil	8,120	1,160	115,737	16,534	494,484	554,420
Diesel and gas oil	.....	.....	8,681	1,240	44,546	27,989
Gasoline	80,120	11,446	139,045	19,864	749,563	485,412
Kerosene	30,780	4,397	.....	.....	91,774	11,738
Exports—						
Crude oil	.....	.....	.....	.....	3,075	71,453
Fuel oil	.....	.....	.....	.....	122,143	51,080
Diesel and gas oil	1,890	270	7,950	1,136	124,540	62,815
Gasoline	33,640	4,806	172,487	24,641	583,553	732,941
Kerosene	.....	.....	.....	.....	133,749	68,030
Lubricants	.....	.....	.....	.....	.....	13,693

Playa Del Rey

The Barnsdall Oil Co. stepped into the picture at Playa Del Rey during the past week by consummating a deal with the Cypress Petroleum Co. whereby it takes over the latter's Del Rey lease embracing a portion of a 12-acre strip immediately adjoining the Ohio's Recreation Gun Club property. The Barnsdall's new property is within 150 feet of the Ohio's discovery well and, while no cash conisderation was involved in the deal, the property will be developed on a 50-50 basis between the two companies subject to a one-sixth royalty. The Barnsdall's first well has been staked within 150 feet of the Ohio's discovery well and tentative plans call for the starting of a second well in the near future.

The Ohio Oil Co. landed a string of 11¾-inch in No. 2 Recreation at 3,847 feet and tentative plans contemplate an early test of the brown shale and oil sand which was still present when drilling was concluded at 3,926 feet. No. 1 Howland, the Ohio's third well in this field, failed to pick up the shallow showings found in No. 2 Recreation, this indicating the possibility that the axis of the structure is west of the discovery well, as many have expected. The Union Oil Co. is driving piles for its initial test on the Del Rey lease, located southwest of the discovery well, and rig construction will be started shortly.

The Los Angeles City Council sanctioned the granting of eight additional permits in this field during the week but no work can be undertaken until the ordinances of intention are passed at a later date. The ordinances adopted by the City Council were the result of petitions filed for drilling permits by Harriett Cleveland, John Davenport, George Acret, William Dickinson, T. B. Young, L. M. Hersee and C. S. Feeney. This makes a total of 14 permits pending in this field at the present time.

Council Urged to Co-operate

James S. Bennett, representing the director of the California department of Natural Resources, urged the City Council at its last meeting to co-operate in the State's campaign for conservation of gas by recommending that the number of permits to be issued in the future be limited. City Attorney Werner had previously advised the council that it had authority to limit the number of wells to be drilled in a given area and, in response to a request from the council, further advised that fees could be imposed and that royalties in the nature of license taxes could be collected on producing wells.

The City Council has been endeavoring to agree on an ordinance whereby the city treasury would be reimbursed from time to time either by a license tax or on a current royalty basis.

The success which the Ohio Oil Co. experienced in its wildcat exploration work at Playa Del Rey has prompted the California Ventura Oil Co. to lease a 50-acre tract in the city of Hermosa Beach, located approximately 4 miles from the new field at Playa Del Rey. The California Ventura's property was leased on a one-eighth royalty from the municipality of Hermosa Beach. Ellis E. Mallory previously leased approximately 75 acres at Manhattan Beach and independent operators have subsequently engaged in a rather spirited leasing campaign. None of the major companies, however, have acquired any acreage at either Manhattan or Hermosa Beach up to the present time.

Belridge

The Belridge Field of Kern County continues to hold the attention of operators as the time draws near for the test to be made of deep sand possibilities discovered by the Belridge Oil Co. in its well No. 15, located in the North Belridge Field in Section 26-27-20. This well, bottomed at 5,088 feet with strings of 6-inch, 8-inch, 10-inch and 13-inch cemented together for protective purposes, is

MAY OPEN NEW MICHIGAN POOL BETWEEN MT. PLEASANT AND CLARE

By Special Correspondent

MUSKEGON, Mich., Mar. 1.—Five new wells brought in last week in the Mount Pleasant Field added 540 bbls. initial production. Of greater importance was the striking of a large flow of gas in the Marshall formation at 1,505 feet in another wildcat 5 miles north of the city of Mount Pleasant and about 10 miles northwest of the Mount Pleasant Field. It lies directly in the path of the field and may open another pool between Mount Pleasant and Clare. The well is Uhl-Sarver-Raymer's No. 1 T. McManaman estate, NW SE, Section 31-16n-4w, Vernon Township, Isabella County.

Gas was struck when drillers were carrying a hole full of water from a water sand struck at 1,025 feet. The well flows by heads hurling a column of water about 25 feet over the top of the derrick every 10 minutes. It had not yet been placed under control and was estimated between 2,000,000 and 3,000,000 feet. It had been drilled only 2 feet in the gas sands to a depth of 1,507 feet.

The Sias Oil Development Co.'s No. 1 Frank Muma well, SW NW, Section 2-14n-3w, Chippewa Township, made 150 bbls. initial in the Dundee topped at 3,508 feet, pay at 3,541 feet, completed at 3,572 feet. This well was reported to have had a flow of 3,000,000 feet of gas in the Marshall formation at 1,145-60 feet but was carried to the Dundee when it was drowned out with bottom salt water.

The Pure Oil Co.'s No. 3 Charles S. Harkins, NE SE, Section 11-14n-3w, Chippewa Township, made 140 bbls. initial in the Dundee. Limestone was topped low at 3,528 feet and pay at 3,565 feet, total depth 3,593 feet.

The Pure company's No. 2-A State-Midland, SW NW, Section 7-14-2, Greendale Township, topped the Dundee at 3,495 feet, pay at 3,515 feet and drilled to 3,570 feet, made 100 bbls. as did the Pure company's No. 3-C Glen M. Reems, NW SW, Section 7-14-2, which had the Dundee at 3,504 feet with pay at 3,536 feet and was completed at 3,580 feet.

The Sias Oil Development Co.'s No. 3 Carpenter heirs, SW SW, Section 7-14-2, struck the Dundee at 3,515 feet, pay at 3,547 feet and was completed at 3,580 feet making 50 bbls.

East Michigan Wildcat

The Exploration Co.'s No. 1 Thomas Wilson, NE NE, Section 7-32n-6e, Long Rapids Township, Alpena County, was dry at 1,110 feet and will be plugged. It is the third or fourth well dry or abandoned in Alpena County during the past 18 months.

Muskegon Field

Two gas wells, an oil well which was increased in production by deepening and a dry hole constituted the list of four completions in the Muskegon Field last week.

The Citizens and Lake Shore Petroleum Co.'s No. 1 Albert Heinz, NW SE, Section 8-10-16, Muskegon Township, made 2,000,000 feet of gas in the lower Traverse at 1,851-79 feet, total depth. The Joliet-Morris Development Co.'s No. 1 John Ehler, SW NE, Section 8-10-16, Muskegon Township, struck gas in the Dundee at 2,031 feet, and at 2,050 feet was making 1,591,000 feet. This is the largest Dundee gas well in the field at present where original Dundee gassers made from 10,000 to 25,000,000 feet initial open flow.

Mrs. C. G. Marsh and others' No. 2 Albert Young, SE NE, Section 12-10-17, Laketon Township, drilled into the lower Dundee pay streak, swabbed about 2 bbls. an hour after being drilled 28 feet deeper than originally from 2,036 to 2,064 feet.

The Central Gas & Oil Co.'s No. 1 John Joldersma, NE SW, Section 8-10-16, on the Muskegon River Flats in Muskegon Township, was dry in the Dundee at 2,018 feet. Indications were the Continental Gas & Oil Co.'s No. 20,

(Continued on Page 285)

Here are 5 cars of gasoline . . .

LOST

from one tank
. . . in 12 months
by evaporation
and wind drift

. . Save them with a J-M Insulated Vapor-tight Tank Top

J-M Insulated Vapor-tight Tank Tops will help materially to conserve gasoline stored for future price increases. 1929 closed with 700 million barrels of oil and gasoline in storage. The evaporation sacrifice of this enormous reserve can be largely prevented.

It is not unusual for J-M Vapor-tight Tank Tops to save as much as $4,000 per tank per year from evaporation—money literally taken from the air. If you will multiply $4,000 by the number of tanks on your farms you will have a rough estimate of the savings these tank tops make available to you.

These economies should not be cast aside lightly nor should the millions of barrels of oil and gasoline in storage be exposed to fire hazard when J-M Tank Tops will afford real protection. Cases are on record where tanks covered with J-M Tank Tops stood unharmed while nearby tanks were ablaze.

The summary of these savings suggests that you investigate at once. Every day is costing money. Your inquiry will be answered with full particulars.

JM PRODUCTS Johns-Manville

VAPOR-TIGHT INSULATED TANK TOPS

(Patented—other patents pending)

Address JOHNS-MANVILLE
At nearest office listed below
New York Chicago Cleveland San Francisco Toronto
(Offices in all large cities)

Please send me a copy of your booklet "Controlling Evaporation."

Name.....

Company.....

Address.....

OI-44-3

scheduled to be tested out within the next few weeks, according to present plans. The Belridge Oil Co. has made elaborate preparations to safeguard against accidents. In addition to anchoring the various casings together, extremely heavy fittings have been utilized. The company installed a special $15,000 Christmas tree and dismantled the original wooden derrick, replacing it with one of steel.

This well looks almost certain of resulting in substantial production, judging from core samples and gas pressures. That company officials expect the development of commercial production is evidenced by the fact that construction work has just been started on an absorption plant to handle future production.

The significance which attaches to this well lies in the fact that it may open up another high gravity field similar to the north dome at Kettleman Hills. The formations are identical and other geological conditions are extremely favorable. It is not likely, however, that this field will become an important factor in production in the immediate future as the acreage is all held in large blocks. The Belridge Oil Co. controls most of the possible productive acreage, although a number of other operators will also get in on the play.

The Union Oil Co. has already started work on a new test to determine the status of its holdings in this area and additional work will also be started by other interested operators. On the Gibson lease in Section 36-27-20 the Union spudded in No. 5 during the early part of the week and staked location for No. 6. The Continental Oil Co. recently staked location for No. 1 Result in Section 36-27-20 and, while this project, like the Union's No. 5 Gibson, will only be carried down in search of shallow production, it may ultimately be deepened if developments warrant.

Santa Fe Springs

The initial daily production of new wells finished at Santa Fe Springs during the past week indicates quite definitely that this field attained its maximum peak during the latter part of January, as has already been mentioned on several occasions, and while the production curve will probably flatten out during the next month or two, the inevitable decline set in some time ago. It is not likely that the present large amount of drilling will be able to cause any appreciable change in production, although there is a possibility that deeper drilling may open up another new zone for future development. Oscar Howard failed to develop commercial production in his deep test but this well revealed the existence of some oil sand out on the edge of the structure which might possibly prove productive on the apex. This deep drilling, if subsequently successful, should not be as erratic as shallower zones because a smaller number of wells will be carried down to it and the production period extended over several months because of difficulties and delays incident to deep drilling.

The General Petroleum, with seven wells actually rotating ahead in the oil sand at the present time, successfully completed two wells in this field during the last week. These were No. 190-C and No. 190-E on the Santa Fe Community Lease, both of which registered small production. The former, bottomed at 7,925 feet, showed an initial of 75 bbls. daily, while the latter, finished at the same depth, made 248 bbls. on a compressor during the first 24 hours following completion.

George F. Getty's No. 43 was also a small well as it was only good for 210 bbls. initially from 7,950 feet. Getty is preparing four other wells for immediate production and, while they should be tested out within the next ten days, none of them show promise of resulting in substantial production. The Shell's No. 24 Golay was a little above the average for the week as this former upper zone producer was returned to production flowing 760 bbls. daily from 7,900 feet, the hole having been finished with a 6⅝-inch combination string.

St. Helens Well Disappoints

The St. Helens Petroleum finished No. 2 Hill in the Clarke zone during the early part of the week but this new well was somewhat of a disappointment as it was only good for 500 bbls. initially from 7,985 feet. No. 2 Mutual of The Texas Company was another disappointing completion chalked up this week as the intial daily production was only 216 bbls. upon recompletion in the Clarke zone at 7,970 feet.

The Texas Company has four other wells nearing completion, although the indications are that one of them will require artificial stimulation. The Universal Consolidated Oil Co., a subsidiary of the Richfield, finished No. 6 O'Connell, a new well in the O'Connell sand doing 310 bbls. daily from 7,979 feet. The Wilshire's No. 1-A Crawford was an even smaller well as it was only good for 130 bbls. per day from 7,100 feet.

A check indicates that there are approximately 40 wells rotating ahead in the oil sand in this field at the present time and, while a large number of these projects will be completed within the next few weeks, past performance indicates that they will not have much effect on field production in as much as the average initial daily production of new wells completed during the past few weeks has been well below 500 bbls.

Elwood

The Pacific Western Oil Co. has resumed partial drilling in the Elwood Field of Santa Barbara County following a suspension of several months' duration and preparations are being made to spud in two new wells in the near future. This will give the company five strings of tools in operation as No. 2 Goleta and Nos. 2 and 3 on permit No. 92 are already making hole. The Barnsdall and Rio Grande have five incompleted drilling projects under way. These are well No. 2 on permit No. 88, No. 6 Doty, No. 1 on permit No. 95 and Nos. 12 and 17 on the Bell Luton lease. It is possible that additional wells will be completed in the Elwood Field during the next several months but this development work will not affect actual field production in as much as these operators have agreed to continue curtailing production until the present crisis has been safely passed and conditions improved.

The Chanslor-Canfield Midway Oil Co. finished No. 11-B Hobson, a new well in the Rincon Field of Ventura County during the past week, but only increased its daily production 35 bbls. The oil from this well, which was bottomed at 3,208 feet, is clean and tests 31.4 degrees A.P.I. No 2-A Hobson has resolved itself into a deep test as a check reveals the present depth at 6,275 feet. The General Petroleum is rotating ahead in a gray sand and oil sand in No. 2 Ferguson, a tideland drilling project out in the open ocean adjacent to productive acreage at Rincon and, while this well registered premature production during the course of a water test a few weeks ago, it is the present intention to continue drilling in order to make a conclusive test.

To Build Pier Extension

The General Petroleum was recently granted permission to construct an extension to its present 1,700-foot Ferguson pier and construction work is expected to get under way within the next 60 days. The new extension will result in the addition of approximately 700 feet to the present 1,700-foot pier. It will shoot off in a southwesterly direction from the end of the present pier and extend down to Neil Needham's tideland drilling permit No. 55, which will be developed by the General Petroleum. The new extension to be added to the General Petroleum's Ferguson pier will be 22 feet wide except at the outer end where the average width will be increased to approximately 75 feet. D. W. Wood recently filed application with the War Department for permission to construct a pier out into the ocean to facilitate drilling operations on tideland permit No. 82, which is situated three locations west of the General Petroleum's Ferguson permit.

The General Petroleum is experiencing difficulty in its wildcat exploration campaign involving the More ranch near Goleta in Santa Barbara County due to extremely high gas pressure. No. 1 More, the first test drilled in this area, was suspended several months ago at 4,533 feet when gas pressure got so high as to jeopardize future development. A second test was subsequently started and this

(Continued on Page 227)

IMPORTANT NORTHERN CALIFORNIA WILDCATS

Company, well, location—	S.T.R.	Depth	Status
Union, No. 1 Buel Canyon, Santa Barbara Co.	X- 7-31	3,675	hd. sd. drilling
Tannehill, L. B., No. 1 Los Olivas, Santa Barbara Co.	23- 7-31	3,900	br. sh. drilling
Standard, No. 1 Point Conception, Santa Barbara Co.	X- 5-34	4,088	br. sh. drilling
Ohio Oil Co., No. 1 Lompoc, Santa Barbara Co.	2- 6-34	1,730	hd. sd. drilling
Prairie Oil Co., No. 1 Lompoc, Santa Barbara Co.	15- 7-35	95	sd. drilling
Fields Gasoline Co., No. 1 Santa Maria, Santa Barbara Co.	8- 9-33	rig	rigging up
Carey, A., No. 1 Goleta, Santa Barbara Co.	1- 4-28	2,880	will test
General Pet., No. 1 Goleta, Santa Barbara Co.	21- 4-28	4,533	gas well—idle
General Pet., No. 3 Goleta, Santa Barbara Co.	21- 4-28	4,350	suspended
General Pet., No. 1 Goleta Tideland, Santa Barbara Co.	21- 4-28	1,025	suspended
General Pet., No. 2 Goleta Tideland, Santa Barbara Co.	21- 4-28	1,927	suspended
General Pet., No. 3 Goleta Tideland, Santa Barbara Co.	21- 4-28	1,016	suspended
General Pet., No. 4 Goleta Tideland, Santa Barbara Co.	21- 4-28	1,035	suspended
General Pet., No. 5 Goleta Tideland, Santa Barbara Co.	21- 4-28	1,040	redrilling
U. S. Pet., No. 1 Goleta Tideland, Santa Barbara Co.	20- 4-28	1,035	suspended
U. S. Pet., No. 2 Goleta Tideland, San.a Barbara Co.	20- 4-28	1,032	suspended
U. S. Pet., No. 3 Goleta Tideland, Santa Barbara Co.	20- 4-28	1,019	suspended
Macmillan Pet., No. 1 Goleta Tideland, Santa Barbara Co.	21- 4-28	175	suspended
Caldwell Brown, No. 1 Goleta, Santa Barbara Co.	24- 4-29	....	loca.ion
Standard, No. 2 Goleta, Santa Barbara Co.	X- 4-30	2,900	br. sh. drilling
General Pet., No. 3 Capitan, Santa Barbara Co.	4- 4-30	1,603	175 bbls.
Oakburn Oil Co., No. 1 Capitan, Santa Barbara Co.	4- 4-30	370	suspended
Oakburn Oil Co., No. 2 Capitan, Santa Barbara Co.	4- 4-30	200	suspended
Oakburn Oil Co., No. 3 Capitan, Santa Barbara Co.	5- 4-30	1,332	cemented
Oakburn Oil Co., No. 4 Capitan, Santa Barbara Co.	4- 4-30	300	suspended
Oakburn Oil Co., No. 5 Capitan, Santa Barbara Co.	4- 4-30	325	suspended
Indian Pet., No. 1 Capitan, Santa Barbara Co.	4- 4-30	230	suspended
Shell, No. 1 Rutherford, Santa Barbara Co.	1- 4-31	rig	rigging up
Wildcat Oil Co., No. 1 Santa Maria, Santa Barbara Co.	20-10-25	4,260	recemented
Pacific Western, No. 1 Gibraltar, Santa Barbara Co.	14- 5-27	2,345	suspended
Shell, No. 1 Summerland, Santa Barbara Co.	18- 4-25	2,325	cemented
Standard, No. 1 Casitas, Santa Barbara Co.	26- 4-25	1,370	sd. sh. drilling
Continen.al, No. 1 Carpenteria, Santa Barbara Co.	33- 4-25	4,130	gas well—idle
Continental, Tideland permit No. 121, Santa Barbara Co.	33- 4-25	55	suspended
Continental, Tideland permit No. 122, Santa Barbara Co.	33- 4-25	158	suspended
Continental, Tideland permit No. 123, Santa Barbara Co.	33- 4-25	125	suspended
Continental, Tideland permit No. 124, San.a Barbara Co.	33- 4-25	990	deep test
Continental, Tideland permit No. 124-A, Santa Barbara Co.	33- 4-25	418	suspended
Continental, Tideland permit No. 125, Santa Barbara Co.	33- 4-25	120	suspended
Continental, Tideland permit No. 126, Santa Barbara Co.	33- 4-25	200	suspended
Continental, Tideland permit No. 127, Santa Barbara Co.	33- 4-25	145	suspended
Continen.al, Tideland permit No. 128, Santa Barbara Co.	33- 4-25	98	suspended
Continental, Tideland permit No. 129, Santa Barbara Co.	33- 4-25	97	suspended
Exeter Oil Co., Tideland permit No. 163, Santa Barbara Co.	32- 4-25	18	suspended
Getty, George F., No. 1 Carpenteria, Santa Barbara Co.	32- 4-25	68	cemented
Getty, George F., No. 2 Carpenteria, Santa Barbara Co.	32- 4-25	55	cemented
Standard, No. 5-9 Saticoy, Ventura Co.	10- 2-22	8,460	redrilling
Bolsa Chica, No. 1-A Temescal, Ventura Co.	4- 4-18	1,880	br. sh. drilling
Fennell, E. A., No. 1 Piru, Ventura Co.	13- 4-19	1,330	sd. sh. drilling
Associated, No. 1 Rincon, Ventura Co.	19- 4-24	915	sd. sh. drilling
Continental, No. 3 Sulphur Mountain, Ventura Co.	21- 4-25	6,325	sd. sh. drilling
Milham Explin., No. 9 Buttonwillow, Kern Co.	8-28-23	4,990	cleaning out
General Pet., No. 1 Buttonwillow, Kern Co.	6-28-23	rig	rigging up
Lincoln Drlg. Co., No. 1 Buttonwillow, Kern Co.	17-29-24	135	suspended
Shell, No. 1 Weed Patch, Kern Co.	29-30-29	50	sd. drilling
Elmer Oil Co., No. 1 Bena, Kern Co.	15-30-30	3,800	suspended
Elmer Oil Co., No. 1-A Rosedale, Kern Co.	33-29-26	5,262	suspended
The Texas Company, No. 1 Edison, Kern Co.	33-29-29	6,000	hd. sd. drilling
Shell, No. 1 Edison, Kern Co.	33-29-29	1,877	hd. sd. drilling
Symark Oil Co., No. 1 Edison, Kern Co.	24-29-29	2,130	suspended
Sayre, F. M., No. 1 Edison, Kern Co.	5-30-29	3,902	sd. sh. drilling
Helen Pet., No. 1 Jasmine, Kern Co.	23-25-27	200	sd. drilling
Bardeen, H. A., No. 1 San Emidio, Kern Co.	18-10-23	100	sd. drilling
Currency Pet. Co., No. 1 Jacalitos, Fresno Co.	28-21-14	3,490	hd. sd. drilling
Knudsen, John, No. 1 Jacalitos, Fresno Co.	14-21-14	1,490	suspended
Petroleum Securities, No. 2 Huron, Fresno Co.	28-20-16	7,390	suspended
Western Gulf, No. 1 Penoche Valley, Fresno Co.	26-15-12	2,834	sd. sh. drilling
Union, No. 1 North Huasna, San Luis Obispo Co.	12-32-14	5,500	br. sh. drilling
Midwest Refining Co., No. 1 Huasna, San Luis Obispo Co.	34-31-15	3,870	gr. sd. drilling
Panorama Oil Co., Well No. 1, San Luis Obispo Co.	7-31-21	4,019	fishing
Paso Robles Synd., No. 1 Creston, San Luis Obispo Co.	27-27-11	3,742	suspended
Union, No. 1 King City, Monterey Co.	8-22- 8	2,902	br. sh. drilling
Standard, No. 1 King City, Monterey Co.	23-22- 7	3,670	hd. sd. drilling
Pacific Inland Oil Co., No. 1 Parkfield, Monterey Co.	19-23-15	781	cleaning out
Penn Western, No. 1 Tulare Lake, Kings Co.	24-21-18	1,338	suspended
Wellport Oil Co., No. 1 Devils Den, Kings Co.	9-24-17	2,920	br. sh. drilling
Oceanside Oil Co., No. 1 Kreyenhagen, Kings Co.	32-22-16	300	suspended
Twin State Oil Co., No. 1 Soldani, Mendocino Co.	14-12- 7	2,400	sd. sh. drilling
Barnhart Trust, No. 1 Oakdale, San Joaquin Co.	3- 2-10	2,550	redrilling
White, Roy, No. 1 Pixley, Tulare Co.	8-23-26	3,780	hd. sd. drilling
Terminal Oil Co., No. 1 Tulare, Tulare Co.	29-20-25	4,198	suspended
Terra Bella Oil Co., No. 1 Porterville, Tulare Co.	35-22-27	900	sd. sh. drilling
Getty, George F., No. 1 Chowchilla, Madera Co.	8-10-14	mtl.	building rig

IMPORTANT SOUTHERN CALIFORNIA WILDCATS

Simmel, L. G., No. 1 Inglewood, Los Angeles Co.	21- 2-14	5,300	sd. sh. drilling
Raleigh Oil Co., No. 1 Malibu, Los Angeles Co.	1- 2-19	3,880	suspended
Clearwater Oil Co., No. 1 Bellflower, Los Angeles Co.	21- 3-12	4,803	sd. sh. drilling
Getty, George F., No. 1 Riviera, Los Angeles Co.	27- 2-12	3,900	hd. sd. drilling
Burlingham Pet., No. 1 Compton, Los Angeles Co.	17- 3-13	2,680	suspended
Diller, W., No. 1 Watts, Los Angeles Co.	8- 3-17	4,280	sd. sh. drilling
Crimson Pet., No. 1 Compton, Los Angeles Co.	22- 3-13	mtl.	building rig
Archer Oil Co., No. 1 Watson, Los Angeles Co.	17- 4-13	5,557	fishing
Harbor Oil Co., No. 1 Wilmington, Los Angeles Co.	18- 4-13	rig	suspended
Shell, No. 1 Van Nuys, Los Angeles Co.	19- 2-15	mtl.	building rig
Anchor Oil Co., No. 1 Puente, Los Angeles Co.	13- 2-10	4,820	suspended
Rucker, R. C., No. 1 Puente, Los Angeles Co.	27- 2-10	3,275	cleaning out
The State Co., No. 1 Puente, Los Angeles Co.	33- 2- 8	850	suspended
Sherman, J. W., No. 1 Puente, Los Angeles Co.	5- 2-10	4,514	abandoned
Keck & Hall, No. 1 Puente, Los Angeles Co.	32- 2- 8	1,130	gas well
Marcel Pet. Co., No. 1 Puente, Los Angeles Co.	31- 2- 8	1,570	hd. sd. drilling
Richfield Oil Co., No. 1 Puente, Los Angeles Co.	34- 1-10	....	location
Los Gatos Oil Co., No. 1 El Monte, Los Angeles Co.	16- 1-11	1,860	hd. sd. drilling
Olympic Corp., No. 1 Calabasas, Los Angeles Co.	18- 1-17	1,825	sd. sh. drilling
Martin, J. W., No. 1 Newhall, Los Angeles Co.	22- 1-17	1,120	suspended
Consolidated Oil Co., No. 1 Newhall, Los Angeles Co.	8- 3-16	1,555	cemented
National Sec., No. 1 Newhall, Los Angeles Co.	1- 3-16	874	suspended
Anderson, P. B., No. 1 Hasley Canyon, Los Angeles Co.	1- 3-16	900	suspended
Pioneer Pet., No. 1 Newhall, Los Angeles Co.	14- 3-16	210	hd. sd. drilling
Union, No. 1 Coyote, Sansinena, Los Angeles Co.	30- 2-10	2,105	redrilling
Tureco Oil Co., No. 1 Whittier, Los Angeles Co.	29- 2-11	....	location
Beard, G. F., No. 1 Brea Canyon, Los Angeles Co.	30- 2- 9	1,099	suspended
Western Gulf, No. 1 Brea Canyon, Los Angeles Co.	28- 2- 9	3,275	br. sh. drilling
Standard, No. 1 Bastanchury, Coyote, Orange Co.	21- 3-10	4,460	sd. sh. drilling
Shell, No. 1 Bastanchury, Coyote, Orange Co.	28- 3-10	6,050	redrilling
Graham & Loftus, No. 1 Coyote, Orange Co.	18- 3- 9	mtl.	building rig
Union Oil Co., No. 1 Richfield, Orange Co.	13- 3- 9	3,120	granite
Mesa Pet., No. 1 Newport, Orange Co.	21- 6-10	4,910	suspended
Oil Well Eng. Co., No. 1 Newport, Orange Co.	21- 6-10	2,795	suspended
Fidelity Pet. Co., No. 1-A Murrietta, Riverside Co.	23- 7- 3	701	cleaning out
Hemet Pet. Co., No. 1 Ward, Riverside Co.	9- 5- 1	3,550	bl. sh. drilling
Imperial Valley Oil Co., Well No. 1, Imperial Co.	32-11-10	2,980	suspended
San Marcos Oil Co., Well No. 1, San Diego Co.	9-12- 3	mtl.	building rig
Turner, S. S., No. 1 Escondido, San Diego Co.	25-12- 2	2,170	suspended
McGregor Synd., No. 1 Del Mar, San Diego Co.	17-14- 3	1,220	sd. sh. drilling
Borderland Oil Co., No. 1 Encinitas, San Diego Co.	12-13- 4	2,200	sd. sh. drilling
Borderland Oil Co., No. 1 Point Loma, San Diego Co.	30-16- 3	550	cleaning out
Grey, H. H., No. 1 Redlands, San Bernardino Co.	25- 1- 2	2,525	cleaning out
Duncan, N. I., No. 1 Mojave, San Bernardino Co.	8- 4- 6	rig	suspended
Girard & Grimes, No. 1 Corona, San Bernardino Co.	8- 2- 8	590	sd. sh. drilling

24-HOUR SERVICE
BRIDGEPORT
RENTAL TOOL SERVICE
AS NEAR AS YOUR PHONE
THE TOOLS YOU NEED
RECONDITIONED TOOL DEPARTMENT
ROTARY or CABLE
Drilling and Fishing Tools — From One Dependable Source
The Bridgeport Machine Company
General Offices and Factory, Wichita, Kansas
Branches Throughout the Oil Fields

BRIDGEPORT SERVICE on Cable and Rotary Drilling and Fishing Tools includes an extensive Rental line. Shown above are some of the tools you may obtain any time, any place through Bridgeport's economical Rental Service. Save time. Eliminate worry. *Order ALL your needs from one dependable source.*

CALL OR WIRE BRIDGEPORT . . . COLLECT

Bulk of Wells in Central Ohio Field

Indiana Only Division in Central West That Failed to Report New Producers. Muskingum and Summit Active

By Whit
Staff Correspondent, Central West Fields

FINDLAY, Ohio., Mar. 3.—But few completions were reported from the Central West Field the past several days, the bulk of the new wells being in the Central Ohio division. Indiana was the only division that failed to report any new wells.

In the old Lima Field of northwestern Ohio, R. T. Rittenhouse drilled No. 8 well, 1,000 feet from the south line and 200 feet from the east line of the Frank Freed, on the oil map as the Peter Foltz farm, NW, Section 6, Eagle Township, Hancock County, which pumped 35 bbls. at 65 feet in the Trenton, at a total depth of 1,380 feet. Star & Clark are drilling No. 18 Alice Stauffer, same section.

In Seneca County, Tiffin Field, A. B. Strouse and others' test, 200 feet from the south line and 600 feet from the west line of the John Stahl, Section 27, Jackson Township, found a small gas well at a depth of 550 feet. Kansas Oil & Gas Co. is drilling a second test on the C. P. Dillon, Section 1, same township. In Liberty Township, Bacon & Wade are drilling on the J. F. Summers, and W. J. Poyser and others are drilling No. 4 on the Milo Saul, Section 36, same township. In Seneca Township, W. C. Parmalee is drilling on the David Zeis, Section 27, and Keith & Salladay are drilling on an unknown farm, Section 33, same township. In Pleasants Township, Hulse and others have a light gas well in the northwest corner of the Albert Abbott, SW, Section 29, at the shallow depth of 475 feet, and in possibly the Niagara formation. Mystic Oil Co. is drilling on the Joe Fish, Section 25, Reed Township.

John Doblinger is drilling a second test on the William G. Black, Section 17, Monclova Township, Lucas County.

J. H. Williams of Pittsburgh, Pa., is reported shut down in his wildcat on the Catherine Walthers, Section 5, Liberty Township, Crawford County, at a depth of 2,580 feet.

In Sandusky County, Ballville Township, J. H. Murphy & Sons are starting a test on the P. H. Fry, Section 31. In Madison Township, same county, the Ohio Oil Co. abandoned old No. 3 Henry Iches, Section 32, and in Woodville Township, abandoned No. 7 Caleb Clink, Section 7, and Nos. 1, 2, 3 and 6 H. Gerke, Section 12, same township.

Near Pemberville, in Freedom Township, Wood County, the Ohio Oil Co. abandoned old No. 5 on the A. D. Rees, Section 24. In Plain Township, near Bowling Green, Murray B. Chidester abandoned old No. 3 on the Irvin M. Hower, Section 26. In Troy Township, J. G. Klingman, pulled out Nos. 2 and 3 Hill & Linke farm, Section 13.

CENTRAL OHIO

Seventeen completions were reported from the Central Ohio fields for the week, of which only two were oil producers with an initial of 44 bbls., seven dry holes and eight gas wells. There were four new locations made and 26 new wells spudding, a total of 30. Work is not slackening up at all, and it is predicted the field will show a great number of new wells and numerous new pools will be discovered before the close of 1930. One of the most interesting areas at this time is in Clay Township, Muskingum County, where more than a dozen wells are under way in Section 3. Hopewell and Jackson Townships, are also spots that will get a nice play during the next few months, more for oil than for gas. The best gas wells for the week were in Brown Township, Knox County, being far above other areas of the field. Summitt County is another interesting gas area with plenty of good looking territory to develop, the gas being found around 4,000 feet.

In Ashland County, Greene Township, the Ohio Fuel Gas Co.'s No. 1-4,929 John Frank Darrow farm, Section 23, is reported a duster. Same company is drilling No. 1-5,023 on the Sadie Stevenson farm, Section 11, Jackson Township. In Mohican Township, Robinson and others' No. 5 James McFadden farm, Section 4, produced 14 bbls. initial from the Berea sand, and is drilling No. 6. Jones and others found a dry hole in No. 7 on the J. J. Winbigler, Section 4, at 630 feet. Crownshield and others are in the Berea at a depth of 725 to 775 feet in No. 3 on the Martin M. Wheeler, with a showing of oil. This well is in Perry Township, same county.

In Lorain County, Grafton Township, the Ohio Fuel Gas Co. has a dry hole in No. 1-4,928 on the John Koliha farm, Lots 46 and 47. Ohio Fuel Gas Co. is drilling No. 1-5,024 on the Gezo Szabo farm, Lot 14, Carlisle Township.

In Wayne County, Congress Township, Barnhart and others' test on the E. and W. White, Section 5, Congress Township, is an average gas well in the lower Clinton formation from 2,949-58 feet. In Chester Township, Harmon & George have a light gas well in No. 3 on the C. Peter Buckholtz, Section 26, in the Brea sand from 670 to 673 feet, and are drilling No. 1 on the J. Garver heirs farm, Section 5. Hulse & Kundtz are drilling on the W. A. Firestone farm, Section 5, same township.

In Holmes County the only change is that the East Ohio Gas Co. has started drilling on the P. E. Bucy farm, Section 15, Richland Township.

In Knox County, Brown Township, two large gas wells were brought in, one being the Ohio Fuel Gas Co.'s No. 3-4,920 on the B. B. Workman, Lot 38, and the Upham Gas Co.'s test on the Phil Bross farm, same lot. The latter well got a pay in the Stray sand from 2,768-87 feet and another pay in the Clinton formation from 2,792-2,806 feet. The Ohio Fuel Gas Co. is drilling No. 5-5,035 on the John P. Koppert, Lot 4, and No. 6-5,036 on the Ray R. Koppert, Lots 4 and 7, same township.

Coshocton County

In Coshocton County, Clark Township, Carpenter, Conkle & Wagers are drilling No. 1 J. W. Patterson farm, Section 6. Ohio Fuel Gas Co. is drilling No. 1-5,025 on the Lewis P. Reiss, Sections 8 and 9, Monroe Township.

In Summitt County, Franklin Township, F. A. Brendall and others are starting two tests, one on the Edward Dewalt, and the other on the E. A. Fairchilds farm, both in Section 25. Eagon and others are drilling No. 3 Samuel Harring, Section 17, Greene Township.

In Licking County, the Hope Construction & Refining Co. is drilling No. 6 Sarah Rector farm, Section 9, Perry Township. Same company has a slight showing of oil on the A. S. and J. Settles, Section 13, Hanover Township, same county, at 2,885 feet.

In Muskingum County, Clay Township, Craig, Adair and others' No. 2 on Howard Tewksbury farm, Section 3, produced 30 bbls. initial from 3,464-3,523 feet, total depth 3,525 feet. Noah Andrews and others are drilling No. 2; Crawley and others are drilling No. 2 on the Nelson McCoy Co. land; William Kline and others are drilling No. 2 on one of the Ramsbottom Pottery Co.'s tracts, and Nos. 3 and 4 on another of the Ramsbottom tracts. Henry Scholl and others are drilling No. 1 Jenkins & Fleming; Kachelmacher Estate is drilling No. 1 Elk Coal Co.'s tract; Crawley and others are drilling No. 1 Austin Cherry tract, all in Section 3. In Perry Township, the Ohio Fuel Gas Co. made three test locations, on the J. L. Sutton, Section 7; No. 1 W. L. McCurdy, Section 2; and No. 1-5,017 on the Charles A. Johnson farm, in the third quarter, same township. In Union Township, the Athey Co. is drilling on the Maud Shepherd farm, Lot 24.

In Athens County, Berne Township, the Ohio Fuel Gas Co. has a fair gas well in No. 1-4,970 H. H. Henry, Section 33, and is drilling No. 2-5,008 on the same farm. Same company drilled a dry hole in No. 2-5,099 T. N. Hoover, Sections 1 and 2, Waterloo Township. Fairfield Oil & Gas Co. found a dry hole on the Sam Jeffers, fractional Section 34, Lodi Township, in the lower Cow Run sand from 660-663 feet. Gross & Freebault's test on the Nellie H. Van Vorhes, Section 20, Athens Township, was dry in the Berea from 1,113-25 feet. Ohio Fuel Gas Co. made a location on the C. H. Tom farm, in Lee Township, same county. Same company's No. 2-5,004 on the F. J. Caldwell, Sections 3 and 4, Carthage Township, was dry in the Maxon and Salt sands at 1,050 feet.

Stark County

In Stark County, Lawrence Township, F. A. Brendall and others are drilling on the L. J. Baucher, Section 1.

In Guernsey County, George McLaughlin's second test on the Charles A. Tompkins, Section 11, Adams Township, is a light gas well in the Berea from 1,038-83 feet. The Kemrow Co. has a dry hole on the Andy Lobonavick farm, Section 13, Millwood Township, same county, in both the Injun and Squaw sands at a total depth of 1,716 feet.

In Belmont County, Wayne Township, J. E. Grimes and others' No. 3 on the J. M. Grimes, Section 32, is a light gas well in the Keener sand from 1,358-90 feet. Norwood P. Johnson is drilling a wildcat on the Chalmer Hendershot farm, Section 23, Richland Township, same county.

In Morgan County, Marion Township, the Kemrow Co. has an average gas well in No. 4 on the L. A. Boyd, Lot 36, in the lower Berea from 1,503-23 feet. Williams Brothers are drilling No. 7 Arthur Smith, Lot 12, and the Ohio Fuel Gas Co. is drilling No. 1-4,941 Frank Hammond farm, Lot 17, same township. Same company is drilling No. 3-4,999 W. B. Miller, Section 16, Penn Township, and Williams Brothers are drilling on the Levia E. Moran, same section. Pure Oil Co. made a location for No. 7 Wilber Bush, Section 28, York Township.

ILLINOIS

Only one completion was reported from Illinois, the Arkansas Fuel Oil Co.'s No. 2 A. J. Ikemire farm, in Prairie Township, Crawford County, which was a duster. O. R. Oil & Gas Co. is drilling on the E. Savidge, Section 36, same township, also drilling No. 2 Noah Gray, Section 1, same township. Montgomery, Weger and others have a rig in on the A. Carter farm, Section 18, Honey Creek Township, same county.

DRILLING SHUTDOWN CONTINUED IN TRI-COUNTY FIELD, KENTUCKY

By Whit

OWENSBORO, Ky., Mar. 3.—The 60-day shutdown of drilling operations in the Tri-County Field expired February 15 but will continue for another 30 days to March 15, and by that time the weather conditions may improve so that work can be done to a better advantage. But few wells were reported from the Owensboro area, and but a few from the eastern part of the State, in the Big Sandy Valley.

The most interesting news for the past few days comes from Muhlenberg County, where a wildcat drilled by C. A. Dally and others on the John W. Drake farm, 8 miles south of production and 12 miles south of Greenville, is reported showing for 45 bbls. At 1,150 feet an oil sand was reported, and a nice gas volume was found at around 1,130 feet, the best oil pay being found at a reported depth of 1,218 feet. This test may mean the opening of another producing pool for the county. In the Greenville Field, the Missouri-Kansas Pipe Line Co.'s No. 1 on the Robertson farm is reported dry. Large blocks of acreage have been leased up in Muhlenberg, Hopkins, Butler, Christian and other counties in the western part of the State, and, if crude prices do not go too low, much wildcatting will be done as soon as conditions permit the moving of materials.

Eastern Kentucky Wells

In Wayne County, District 2, Monticello Field, the Vulcan Oil Co. has at last given up its No. 25 on the State National Bank land as a dry hole. In the same district, the Johnson Oil Co. drilled a dry hole in No. 1 on the Louis Sheffield farm. In District 3, the Smith-Cameron Co.'s No. 3 Silas Bell farm also proved a dry hole, and in District 13, M. D. Shearer found a dry hole on the F. H. Upchurch farm, all in Wayne County.

In Morgan County, District 6, W. H. Collier's No. 3 on the V. P. Haney Upper lease produced 2 bbls. initially.

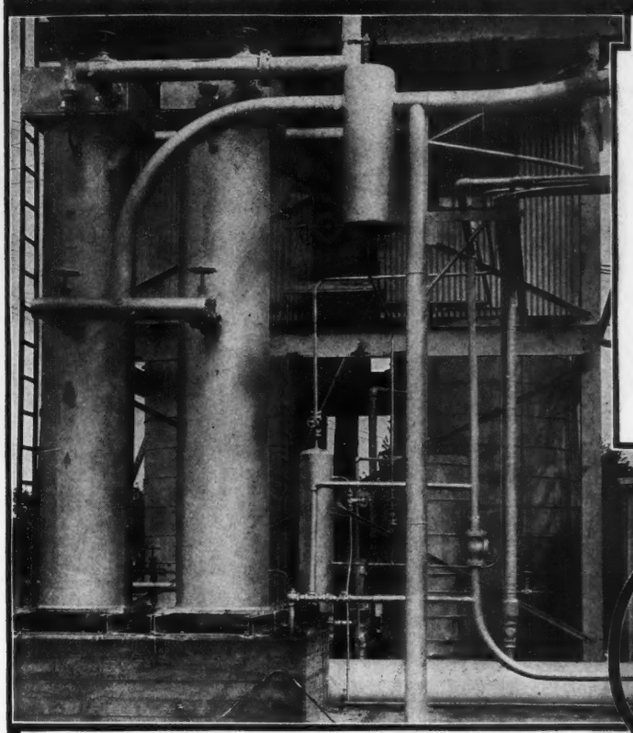
In District 25, Johnson-Magoffin Counties, the Cumberland Petroleum Co.'s test on the George Helton farm is reported at 2,350 feet and will be a deep test, while the Bed Rock Oil Co.'s No. 1 W. H. Conley, in the same district, has reached 1,965 feet. In District 27, the Mosbald Development Co.'s test on the Vandepool-Dowery farm produced 8 bbls. initial from the Weir sand. In District 29, the Pittsburg Trust Co.'s No. 2 Charles Wheeler pumped 3 bbls. Hudson, Collins and others are working at No. 19 Elize and Mahala Conley, same section. In District 31, Hupp, Duff and others are drilling No. 9 J. M. Frazier farm.

Western Kentucky Wells

In Daviess County, the Eastern Gulf Oil Co.'s No. 4, on the Ethel Chapman farm, in the Jones Pool, is reported good for 25 bbls. Kemrow-Cumberland Petroleum Co.'s No. 1 W. B. McCormick, in the Utica Pool, is reported dry in the Brown sand at 1,288 feet. Evans & Garrison drilled No. 1 J. M. Clark, in the Utica Pool, through the McCloskey sand at 1,780 feet, and it was dry.

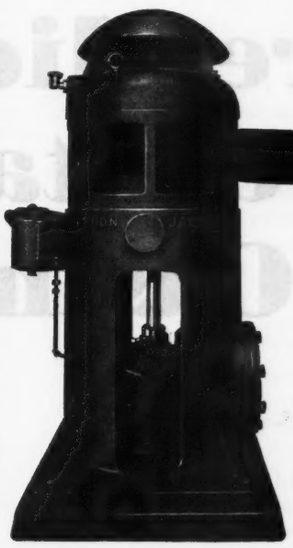
In Ohio County, the best of the late completions is C. M. Root's No. 6, on the Nancy C. Wigginton farm, in the new Buford Pool, northwest of the Barnett Church Pool. It produced 150 bbls. initial. L. C. Young drilled a dry hole

(Continued on Page 203)



REFINERY WATER SUPPLY

Byron Jackson Deepwell Turbine Pumps installed in bored wells offer an inexpensive and reliable water supply for industries. This company was the first to develop the deepwell turbine principle some thirty years ago and in the intervening years this pump has been improved and refined until today it is standard equipment with many large pump users. The pumping element is hydraulically efficient without sacrificing strength and ruggedness. The drive shaft is totally enclosed from top to bottom and oil lubricated where it operates in bronze bearings spaced six feet apart. Strongly and simply constructed, the discharge head has the driving motor built in as an integral part. Thrust bearing and adjusting nut are on top of motor, readily accessible. Fine materials and careful workmanship, together with time-tested design, insure years of efficient, trouble-free operation. In addition to Deepwell Turbine Pumps, this company manufactures a complete line of centrifugal pumps for every service. Write or call the nearest branch for information about pumps to meet your requirements.



SINCE 1872

BYRON JACKSON CO.

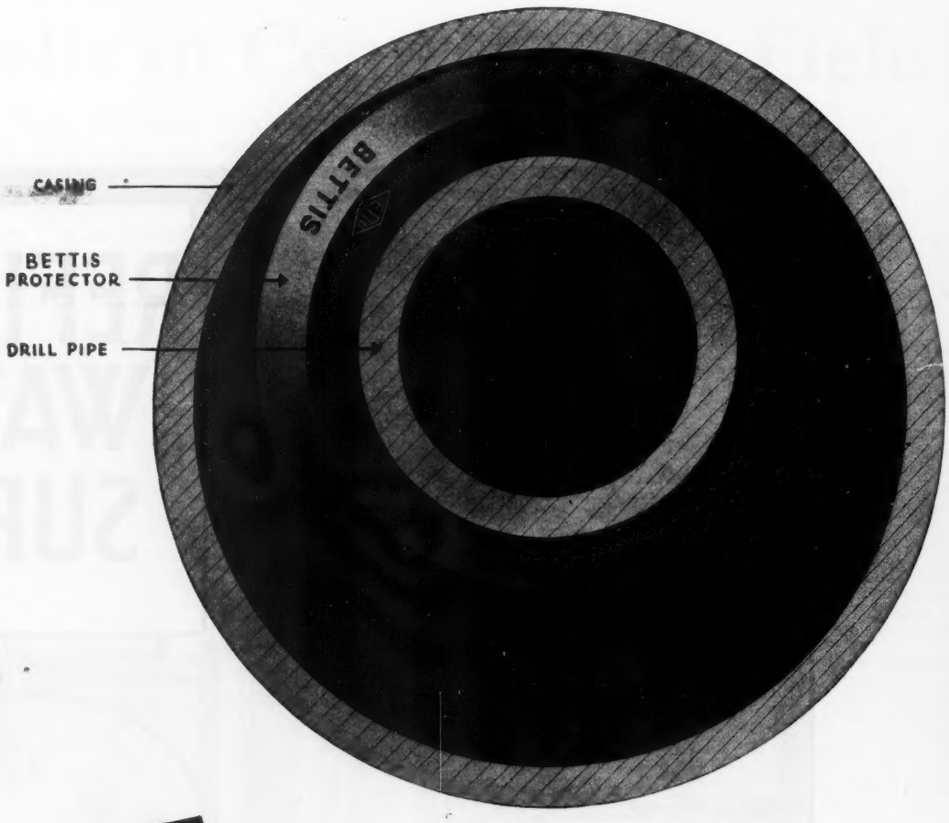
Factories: BERKELEY, Los Angeles, Visalia, Calif.

Branches: NEW YORK and CHICAGO

San Francisco, Portland, Salt Lake, Tulsa, Dallas, Phoenix

BYRON JACKSON

CENTRIFUGAL PUMPS FOR EVERY SERVICE

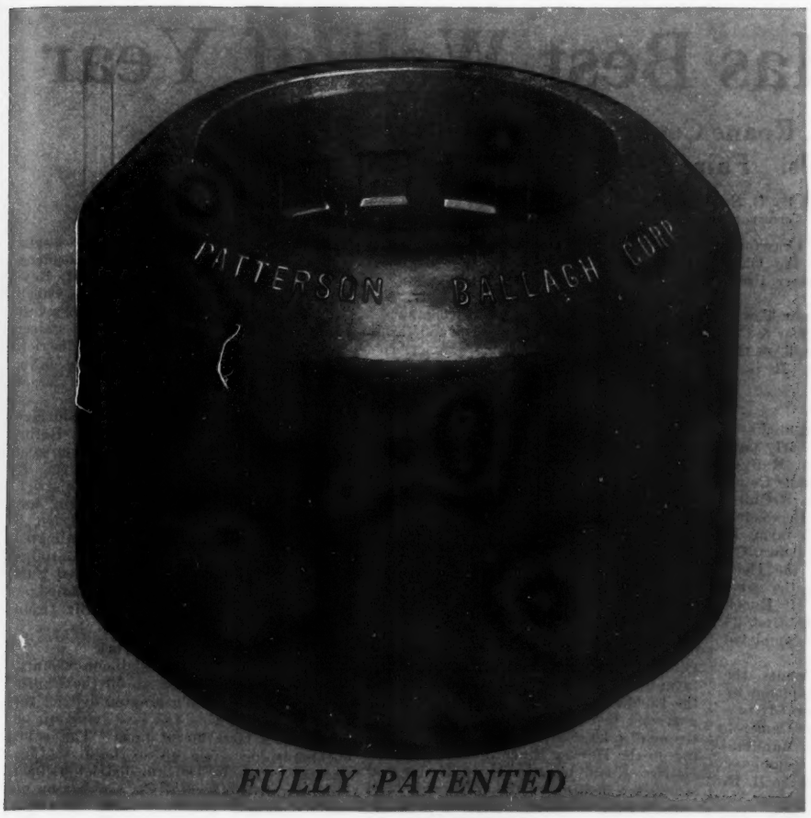


A continuous ring of resilient rubber contacting the Casing.

"Best bet yet!"

No Hinges
No Metal
No Pins
No Wire
No Knobs
No Gadgets

The Original all rubber



The only Simple Protector

THE PROPER Cushion Area

The extreme simplicity of the Bettis Protector is one of its outstanding advantages and by reason of its patented features, is the one and only Protector embodying the basicly correct design. Fundamentally the purpose of the rubber is to provide a durable cushion to prevent contact of pipe with casing. The liberal amount of rubber in the Bettis Protector offers greatest contacting area —a continuous annular ring of resilient rubber that does not tear or rip off. The special mix of rubber developed in the Bettis laboratories is the toughest known. We do not depend upon outside plants for the rubber. Uniformity of product can only be achieved within a laboratory developed for the manufacture of rubber for a specific application.

Study the simplicity of the Bettis Protector. Then consider the fact that more than 275,000 have been placed in service. And consider the fact that 95% of all deep wells now drilling are equipped with them. Then bear in mind that practically every record for speed and deep drilling has been made in wells Bettis-equipped.

There is no substitute for Bettis protection. It is the safe, proven method, backed up by Bettis field and factory service.

Patterson-Ballagh Corp.
Insurance Exchange Building, Los Angeles

Texas and Gulf Coast Distributors:
BETTIS SALES CO., 616 Public National Bank Bldg., Houston
Oklahoma Distributors:
BAILEY & BECKER COMPANY., 410 Thompson Bldg., Tulsa
New York Office: 39 Cortlandt St.

Carried in stock at Los Angeles, Santa Fe Springs, Ventura, Kettleman Hills, Bakersfield, Coalinga, Long Beach, Tulsa, Houston, Wink, Texas; Calgary, Alberta, Canada; New York City.

Bettis Protectors

West Virginia Has Best Well of Year

One in Reedy District, Roane County, Produced 175 Bbls. and Another 140 Bbls. Fair Wells in Southeast Ohio

By D. S. Wakenight
Staff Correspondent, Eastern Fields

PITTSBURGH, Pa., Mar. 3.—In the SW of Section 4, Harrison Township, Perry County, Ohio, the Twin States Oil & Gas Co. has completed and shot in the Clinton sand a test on the William McDonald & Co. farm. It produced 60 bbls. the first 24 hours. In the SE of Section 11, Wheeling Township, Guernsey County, the Preston Oil Co. has completed in the Niagara lime a second test on the C. C. Wilson farm. It is a natural producer and placed 50 bbls. to its credit the first 24 hours.

In the SW of Section 34, Newton Township, Muskingum County, Walsmith & Watson have a duster on the John Spring farm. In Section 30, Clay Township, Perry County, the Wehrle Co.'s second test on the L. E. Wright farm is a duster.

SOUTHEAST OHIO

In the Fisher Pool, Section 30, Athens County, the Townsend Oil & Gas Co.'s No. 9 on the Sarah E. Penrod farm is a 6-bbl. pumper in the Berea grit. In Lot 292, Sutton Township, Meigs County, the Southeastern Ohio Petroleum Co. has a light gasser in the Berea grit on the Henry Potts farm. In Section 11, same township, Delbert Bachelder has a duster in the Cow Run sand on John and Nellie Arnett farm.

In Palmer Township, Washington County, Robert W. Turney & Co. have a very light pumper at No. 8 on the Myron E. Leasure farm. In the same township, C. S. Hixson & Co. have one of the same kind at No. 8 on the Willis C. Ellis farm. In Perry Township, Muskingum County, the Wittmer Gas Properties Co. has a gasser on the Thomas Treahany farm. In the same township the Preston Oil Co.'s second test on the John C. Hicks farm is also a gasser.

In Short Creek Township, Harrison County, George A. Hillegas has a light pumper in the Berea grit on the George A. Hillegas farm. In Sutton Township, Meigs County, the Southern Ohio Petroleum Co. has a fair gasser in the Berea grit on the Henry Potts farm. In the same township, Delbert & Bachelor have a duster in the Cow Run sand on the John and Nellie Arnett farm. The Twenty-Five Association, Inc., had the same luck at a second test on the Stanley Holter farm.

Monroe County

In Section 31, Aurelius Township, Monroe County, Joseph Hall has completed a test on his own farm. It is a very light pumper. In Section 31, Marion Township, Morgan County, C. E. Bode and others have a 2-bbl. pumper on the S. C. Allen farm. In Springfield Township, Jefferson County, Brown, Vorhees and others are drilling on the Dorrence heirs' farm. In Hopewell Township, Muskingum County, the Preston Oil Co. is due in the sand at No. 5 on the F. R. Varner farm. In York Township, the Pure Oil Co. has a rig up on the Wilbert Bush farm.

In Clarke Township, Coshocton County, Carpenter, Wagers & Co. completed a second test on the Herbert B. Osborne farm. It is a 5-bbl. pumper in the Berea grit. In the SE of Section 14, Washington Township, Hocking County, the Gordon Oil Co. completed a second test on the C. J. and W. C. Meldrim farm. It is a 10-bbl. pumper in the Clinton sand.

Washington and Coshocton Counties

On Archers Fork, Section 33, Independence Township, Washington County, Herlan Schram & Co. have a duster in the Mitchell sand at No. 14 on the J. H. Ward farm. In Section 6, Crawford Township, Coshocton County, the Ohio Fuel Gas Co.'s test on the Lester Prestins farm is a duster.

At Bolins Mills, Section 4, Knox Township, Vinton County, H. C. Farmer & Co. completed in the Berea grit No. 3 on the John and Loui Stanley farm. It is a gasser good for 1,350,000 feet.

WEST VIRGINIA

The West Virginia fields presented several fair producers during the early part of the week. On Sugar Camp Run of Reedy Creek, Reedy district, Roane County, the Hope Construction & Refining Co. completed and shot in the Berea grit its No. 3 on the H. F. Enoch farm. It produced 140 bbls. the first 24 hours. On the same stream and district, the Heck Oil Co. completed and shot in the same formation No. 6 on the W. H. Enoch farm. It produced 175 bbls. the first 24 hours. This is the largest well completed in West Virginia this year.

In Church district, Wetzel County, the Stewart Oil & Gas Co. has completed its test on the George Stewart farm. It is a gasser in the Gordon sand. In Cameron district, Marshall County, the Manufacturers Light & Heat Co. has completed in the same formation No. 3 on the B. R. and A. Chambers farm. It is a gasser.

In Troy district, Gilmer County, the Carnegie Natural Gas Co. has now drilled its test on the John V. Young farm through the Fifth sand and it is dry in all sands. In the same district the Trainer Oil & Gas Co. has a duster in the Gants sand on the J. W. Snyder farm. The Carnegie Natural Gas Co.'s No. 3 on the Clinton Burton farm is a gasser in the Big Injun sand. In Center district, Roane County, the United Fuel Gas Co. is drilling on the M. Hart farm.

Boone County

In Sherman district, Boone County, the Pure Oil Co. completed in the Berea grit No. 34 on the L.H.&P. Tract B. It is a light gasser. In the same district, the same company's No. 38 on Tract A is a 10-bbl. pumper. In the same district, G. L. Cabot has a light gasser at No. 35 on the Federal Coal Co.'s tract. In Elk district, Kanawha County, the United Fuel Gas Co. has a light gasser in the Berea grit at No. 3,965 on the Numa Black Coal Co.'s tract. In Cabin Creek district, the same company's No. 4,052 is a fair gasser.

In Sheridan district, Calhoun County, Clem Morris has started to drill on the Phillip Nichols farm. In the same district, P. F. Crawley has started to drill on the Jefferson Bennett farm. In Center district, Gilmer County, the Hope Construction & Refining Co. has a rig up on the Mary A. Stump farm. In Jefferson district, Lincoln County, Pridemore & Adkins have started to drill on the Elizabeth Tutor farm. In Grant district, Cabell County, the Hamilton Gas Co. has rig material at a location on the Lafayette Knight farm.

Calhoun County

In Sherman district, Calhoun County, the Southeastern Gas Co. has completed a light gasser in the Big Injun sand on the H. A. Linger farm. On the waters of King Knob farm, Murphy district, Ritchie County, Weirick & Snyder completed a test on the Zach Weirick farm. It is a gasser good for 1,000,000 feet.

Two and one-half miles in advance of developments in Center district, Calhoun County, the Hope Natural Gas Co. has a rig completed on the Dora Stump farm. On Trace Fork, DeKalb district, Gilmer County, C. V. Maloney and others have the rig completed on the Craddock-Hardman farm. On Laurel Run, in the same district and County, P. G. Davis and others have the rig completed on the Elva J. Hardman farm.

Ritchie County

In Clay district, Ritchie County, the Fox Farm Oil & Gas Co. has completed a second test on the George Darnell farm. It is a duster. In the same district, Devitt & Devol have completed a test on the J. B. Cunningham farm. It is also a duster.

In Central district, Doddridge County, the Hope Construction & Refining Co. has a 10-bbl. pumper at No. 4 on the G. W. & Zilla Pigott farm. In the same district, Cisco Dotson and Arthur Yeater are drilling on the J. D. Foley and Wilson-Broadwater farms. In Reedy district, Roane County, the Hope Construction & Refining Co. has a 10-bbl. pumper at No. 3 on the L. Vandal farm.

In Ellsworth district, Tyler County, J. H. Pentz has a duster at No. 3 on the J. A. and E. Smith farm. In Ravenwood district, Jackson County, the South Penn Oil Co.'s No. 4 on the C. S. McCarty farm is a duster. In the same district the Field Gas Corp. had the same luck at a second test on the P. Wade farm. In Grant district, Starr and others are drilling on the Harvey Starr farm. In Reedy district, Roane County, R. E. Lester and others are drilling on the O'Harra estate.

In Central district, Doddridge County, the Hope Construction & Refining Co. has completed in the Gordon sand No. 4 on the G. W. and Zilla Pigott farm, showing for a 10-bbl. pumper. On Flint Run, Clay district, Wirt County, Grover Whitecotton and others have the rig completed on the C. C. Jackson farm.

Cabell County

On the waters of Mud River, Grant district, Cabell County, the Harshbarger Oil & Gas Co. has completed and shot a test on the Hubbert Hatfield farm. It is a fair gasser in the brown shale. On the same river, located on Indian Fork, the Larner Gas Co.'s No. 97 on the Henry Stone farm is a light gasser in the same formation. On Fudges Run, 2 miles northeast of Beckett station, the Hamilton Gas Co. has completed in the brown shale a test on the Mary Beckett farm. It is a light gasser.

Clay County

In Henry district, Clay County, the Virginian Gasoline & Oil Co. completed in the Big Injun sand No. 8 on the H. D. Summers farm. It is a 5-bbl. pumper. In Cabin Creek district, Kanawha County, the Pure Oil Co.'s No. 247 on the Williams Coal Co.'s tract is an 18-bbl. pumper in the Berea grit. In the same district and on the same property, the same company has a 10-bbl. pumper in the same formation at No. 246.

In Harvey district, Mingo County, the Red Jacket Oil & Gas Co. has completed No. 12 on the Red Jacket Consolidated Coal & Coke Co., Inc., and has a gasser in the Maxon sand good for 1,500,000 feet. The location is 1,500 feet west of No. 11. In the same district E. J. Evans has drilled No. 11 on the Lawrence Ferrell farm into the same formation and it is a gasser good for 500,000 feet. The location is 1,000 feet northwest of the test on the Alta Phelps farm.

Roane County

In Geary district, Roane County, Richard Elkins and others have completed a test on the James Cottrell farm. It is a gasser in the Salt sand. In Sherman district, Calhoun County, the Hope Construction & Refining Co. has a 2-bbl. pumper at No. 1,117 on the M. W. Stump farm.

In Center district, Gilmer County, the Carnegie Natural Gas Co.'s second test on the D. Stout farm is dry and abandoned. In Carroll district, Lincoln County, the United Fuel Gas Co. has a gasser at No. 4,011 on the Margaret Jayne farm. In the same district the Allegheny Gas Co. has a gasser on the N. H. Reynolds farm. In Grant district, Cabell County, the Penn Natural Gas Co.'s test on the Pearl Freeman farm is a gasser in the Berea grit. In Duval district, Lincoln County, the Guyan Oil Co.'s No. 48 on the Gordon Mason farm is a gasser in the same formation.

In New Milton district, Doddridge County, the Hope Construction & Refining Co. has completed in the Gordon sand No. 3 on the John M. Gribbel farm. It is a 3-bbl. pumper. In Sherman district, Calhoun County, the same company has completed in the Big Injun sand No. 3 on the F. S. Barr farm. It is estimated good for 5 bbls. The Virginian Gasoline & Oil Co. has taken over the United Fuel Gas Co.'s test on the Mary D. Hanshow farm and is drilling it to the Big Injun sand.

Starting New Work

In Sheridan district, Calhoun County, Clem Morris is rigging up on the Phillip Nichols farm. In Washington district the Hope Natural Gas Co. is rigging up on the Flora Greathouse farm. The same company has a rig up on the J. C. Carpenter farm. In DeKalb district, Gilmer County, J. G. Davis & Co. are rigging up on the Alva J. Hardman farm. In Cabin Creek district, Kanawha County, the United Fuel Gas Co. is starting and drilling 7 wells on the Sunday Creek Coal Co.'s property. In the same district, the Pure Oil Co. is drilling three wells on the Williams Coal Co.'s tract.

In Cabin Creek district, Kanawha County, Godfrey L. Cabot, Inc., is drilling 4 wells on the Huntington Development Co.'s tract. In the same district, Frank J. Kendall & Co. are drilling deeper their test on the Frank J. Kendall farm. In Elk district the Hope Natural Gas Co. is drilling on the John Wanner farm. In Louden district, Kanawha County, the United Fuel Gas Co. is building a rig on the Black Band Coal & Coke Co.'s property. In Big Sandy Creek district, the United Fuel Gas Co. has made four locations on the King Land Co. and J. D. Campbell properties. In Sherman district, Boone County, the Pure Oil Co. is drilling three wells and a location made for another on the L.R.&P. Co.'s Tracts A and B.

In Scott district, Boone County, the United Fuel Gas Co. is building a rig on the Mohler Lumber Co.'s tract. In the same district the Owens Bottle & Machine Co. has made a location on the Cora Baker farm. In the same district the same company has a rig up on the Sylvester M. Wheeler heirs' farm. In Williams district, Wood County, McKinney & Riggs have started to drill on the Abraham Johnson farm. In Grant district, Ritchie County, Park Bowser has started to drill on the H. C. Cunningham farm.

Marshall County

In Liberty district, Marshall County, the Manufacturers Light & Heat Co. is rigging up on the William Hinkle farm. In the same district, the Marshall-Preston Oil Co. has moved the rig and started a new hole on the Belle Clark farm. In Mannington district, Marion County, Sutton Brothers are building a rig on the L. S. Thomas heirs' farm. In West Union district, Doddridge County, Zickefoose & Swadley have a rig up on the John Batton farm. The Gilco Oil & Gas Co. has made a location on the Evert Woofter farm in Troy district, Gilmer County. In Clay district, Monongalia County, the Philadelphia Gas Co. has shut down to test for oil on the Enos Moore farm. In the same district the same company is

(Continued on Page 203)

The MODERN REFINERY

A place where choicest elements of crude oil are scientifically separated from the less desirable through a controlled procedure of refining.

Every reputable refiner jealously guards each step throughout the various stages encountered during the refining processes to guarantee that the products will measure up to the high standards for which they are known.

No refiner is more careful in the effort to produce refined products of High Quality than are we to see that the equipment and supplies offered to the Petroleum Industry through our organization are of the very highest standard.

Whether in the Refining or some other Division of the Industry, our Quality Products are daily proving to be a leading factor in the successful and economical development or operation of properties.

AXELSON MANUFACTURING CO., LTD.
Sucker Rods, Pull Rods, Working Barrels, etc.

DONOVAN BOILER WORKS
Oil Country Boilers and Tanks

BEAUMONT IRON WORKS COMPANY
Dreadnaught Rotary Drilling and Pumping Equipment

FRICK-REID SERVICE RUBBER BELTING
Our Own Specifications

JONES & LAUGHLIN STEEL CORPORATION
Tubular Goods, Seamless and Lapwelded

J. P. RATIGAN
"Sure Grip" Line of Pumping Equipment

NATIONAL TRANSIT PUMP & MACHINE COMPANY
Pumps and Pipe Line Equipment

WILLIAM POWELL COMPANY
Valves for the Oil Industry

JOSEPH REID GAS ENGINE COMPANY
Two and Four Cycle Gas Engines, Pumping Powers, Refinery Equipment

JOHN A. ROEBLING'S SONS COMPANY
Wire Lines and Welding Wire

ROSSENDALE-RUBOIL COMPANY
"Camel Hair" and Stitched Canvas Belting

WALWORTH COMPANY
Fittings and Valves for all branches of the oil industry.

WHITLOCK CORDAGE COMPANY
Manila Cordage, including Drilling Cables, Bull Ropes, Cat Lines, etc.

FRICK REID SUPPLY CORPORATION

Pittsburgh, Pa. • • • • Tulsa, Okla. • • • • and Branches

Field Problems and Their Solution

EDITED BY THOMAS F. SMILEY

In order that men connected with the drilling, producing and transporting branches of the petroleum industry may procure quickly a solution of many problems confronting them from time to time in their work, The Oil and Gas Journal has arranged with leading engineers and other recognized authorities to answer questions submitted by readers of this publication pertaining to the work of drilling and producing crude oil and transporting this product.

Everyone is invited to submit questions freely. These questions will be submitted to proper authorities by Mr. Smiley, who edits the page, and answers, based on the best available information, will be published. Each question should give as much detail as possible, especially where it relates to matters where depths of sands, types of sands and operations on adjoining properties would have a bearing on the problem involved. The source of all questions will be considered as confidential and only initials will be published in connection with the question.

In this connection, The Oil and Gas Journal will be glad to publish articles from field men who have devised new methods or practices which are improvements.

In case an immediate answer is important, one will be given by mail if the writer requests it.

DEPENDS ON THE PACKER

If a packer was run on a string of 2-inch tubing and working barrel run below at about 150 feet, could this well be made to pump without removing the packer if the well did not flow?—J. E. S.

The results you could expect in pumping this well with a packer on a string of 2-inch tubing would depend largely upon the type of packer used. If a pumping packer has been used there would be no trouble encountered in running rods and valves through the 2-inch tubing or the packer for they are so designed as to permit easy passage of the valves and parts through them.

On the other hand if some type of flow packer has been used on this 2-inch string of tubing it could be possible that the annular space inside the packer has been made so small that the valves and rods would not pass through the packer and under such condition the well could not be pumped.

If the opening through the packer is large enough to permit the rods and traveling valve for the working barrel to be passed through it there should be no difficulty encountered in pumping the well if it produced any oil from the sand even though it would not flow by the natural energy available from the producing horizon.

ON DEEP-WELL DRILLING

Please let me know the titles and authors of some of the best books on deep well drilling by cable-tool methods.—W. J. H.

"Deep Well Drilling," by Walter H. Jeffery, Second National Bank Building, Toledo, Ohio, and "Petroleum Production Engineering," by L. C. Uren, published by the McGraw-Hill Book Co., New York, are suggested as meeting your needs.

ABOUT VARIETY OF SUBJECTS

Kindly answer the following through your page in The Oil and Gas Journal:

1. Section, township and range of the discovery well in the Cushing Field. Date of completion, total depth, what sand, and initial production.

2. Section, township and range of the first well in the same field deepened or drilled to the Bartlesville sand. Date of completion, total depth, owner's name and initial production.

3. B. B. Jones' origin, present address, business before Cushing excitement.

4. Approximate amount and value of oil produced on Jackson Barnett 80-acre lease south of Drumright to date.—C. A. E.

1. The Cushing discovery well, in Section 31-18-7, was completed in March, 1912, at a total depth of 2,347 feet. Its initial production was 400 bbls. a day. It was owned by C. B. Shaffer.

2. The first well in the Cushing Field deepened or drilled to the Bartlesville sand was that of the Prairie Oil & Gas Co., in Section 3-17-7. It was completed in December, 1913, at a total depth of about 2,675 feet (average for the pool) and it had an initial production of 2,000 bbls.

3. In 1904 Bernard B. Jones, who had filled various positions as a railroad man, went to Bristow, Okla. (then Indian Territory), where for a while he was cashier of the First State Bank, after which he entered the land business. In 1910 Mr. Jones leased several thousand acres of land in Creek County, Oklahoma, and the next year, in conjunction with T. B. Slick of Clarion, Pa., drilled the first well in territory which was to become famous later as the Cushing Field. The well was rated as a 10-bbl. producer. There was no market for the oil and the well was abandoned. After this Mr. Jones gave C. B. Shaffer a 1,000-acre lease for drilling a well. The Shaffer test was the forerunner of the great Cushing Pool. Mr. Jones was born in Macon, Miss., September 26, 1866. After attending the public schools and the A. and M. College of Mississippi he was employed by the Illinois Central Railroad for 19 years successively as telegrapher, agent, train dispatcher and train master, working on every main line division and a few branches of the road south of the Ohio River. The last address of Mr. Jones in possession of this department was Washington, D. C.

4. Records show that the Jackson Barnett lease has produced 5,500,000 bbls. of oil. It would be difficult to offer even a fair approximation of the value of this oil.

RECIPROCATING PUMPS

Such references to reciprocating pumps as I have read do not make it clear to me how they operate or how they differ from other pumps. I wish you would tell me something about these pumps, how they are different from other pumps and how they are operated.—O. S. H.

The principle on which the reciprocating pump operates is simple, but there may be difficulty in making it clear without a diagram. The following explanation is taken from the handbook on pumping published by Goulds Pumps, Inc.:

"The essential parts (of the reciprocating pump) are first a crankshaft with crank. As the crankshaft is revolved the crankpin follows a circular path of a diameter which is twice the distance between the center of the crankshaft and the center of the crankpin. The distance between these two centers is known as the 'throw' of the crank.

"To the crankpin is fastened one end of the connecting-rod. The other end is fastened to the plunger. The connecting-rod changes the rotary motion of the crankshaft to the straight-line motion of the plunger. In the larger sizes of pumps the plunger end of the connecting-rod is fastened to a 'crosshead' instead of directly to the plunger. This puts the side thrust on the crosshead guide instead of on the cylinder wall and thus increases the length of the life of the plunger. The crosshead and the guide can be properly lubricated to take the load while the plunger and cylinder cannot. In the small pumps the side thrust is not great enough to give trouble. As the crankshaft is turned, the plunger is moved into and out of the cylinder with a reciprocating motion. This is the reason for the name of the pump.

"In a new installation it is necessary to fill, or 'prime,' the valve chambers and cylinders with liquid. Once done, they will stay filled if the suction line is tight enough to prevent the drawing in of air where the pressure is less than atmospheric."

WHY WAS IT CALLED THAT?

MUD HOG

Anybody whose ears have been assailed by the voices of the farmyard catches a familiar note when he hears the deep-throated gurgle of a rotary slush pump. It calls to his mind the guttural noises that issue from a pig wallowing soulfully in a mire. Drillers were quick to detect the similarity and to apply the name "mud hog" to this type of pump.

BOUNDARIES OF VAN UPLIFT

Please give the western, southern, eastern and northern boundaries of the high on which the Pure Oil Co.'s Van oil field is located. The company is reported to have located by geophysical methods an uplift 6 miles wide by 10 miles long.—J. M. M.

The December, 1929, Bulletin of the American Association of Petroleum Geologists contains a paper on the Van area by R. A. Liddle, geologist for the Pure Oil Co. The structure was defined by core drill holes located approximately north, east, south and west from the discovery well on the periphery of a circle that would have a radius of about 3 miles.

This circle roughly includes the acreage that is being pooled under the unit operation agreement but it does not include what is known to be the full extent of the uplift upon which this pool is located. Your figures are approximately right if you consider the north and south dimension as 6 miles and the east and west distance as 10 miles each axes to pass through the discovery well.

In the October Bulletin of the American Association of Petroleum Geologists there are two other papers dealing with this territory, one by A. C. Ellisor entitled "Correlation of the Claiborne of East Texas with the Clairborne of Louisiana" and the other by Messrs. Wendlant and Knebel entitled "Lower Claiborne of East Texas with Special Reference to Mount Sylvan Dome and Salt Movements." These bulletins can be obtained from the A.A.P.G. headquarters in the Tulsa Building, Tulsa, Okla., for $1.50 per copy.

The geological work in the Van area was a combination of geophysical instrument work and core drilling.

SINGLE-STAGE VS. TWO-STAGE

In figuring on air-compressor installations, how is it determined whether it is best to use single-stage or two-stage? For example, for a gauge pressure of 90 pounds per square inch which would be the better? Is there any specific point in pressure beyond which two-stage compression should be employed?—N. G. N.

It is impossible to name any definite line in the range of capacities and pressures up to which single-stage compression should be used and after which two-stage. Varying conditions inevitably will result in overlapping. In this connection the "Trade Standards" adopted by the Compressed Air Society, say:

"For gauge pressures below and up to 60 pounds per square inch single-stage compression should be employed. Whether to use single-stage or two-stage compression for pressures between 60 and 100 pounds per square inch will depend largely on the capacity required, the cost of the driving power, the altitude at which the machine is to work and whether it is to be a permanent installation.

"There is no doubt but that multi-stage compression is more economical for gauge pressures over 60 pounds per square inch though single-stage compressors of less than 350 cubic feet per minute displacement are to be recommended as satisfactory for pressures as high as 110 pounds per square inch.

"It is generally recognized that multi-gauge compression should be used for permanent installations for pressures of 100 pounds or more, with displacements of 300 cubic feet per minute or more. Discharge gauge pressures of 80 to 125 pounds per square inch are considered for two-stage compression.

"Single-stage sea-level compressors compressing to 100 pounds per square inch should not have a stroke greater than 14 inches. This is because of the difficulty of cooling the air and compressor parts which have been heated due to the heat of compression. This is much more important at altitudes.

"While the capacities and pressures given above are to be recommended, there are, of course, conditions which sometimes require a deviation from these values to secure the best results. The operation of these special types of compressors is commercially successful, both from a practical point of view and an engineering point of view. For example, the straight line oil, gas and gasoline engine-driven compressors must have a longer stroke and greater speed on account of the characterisites of the driving unit.

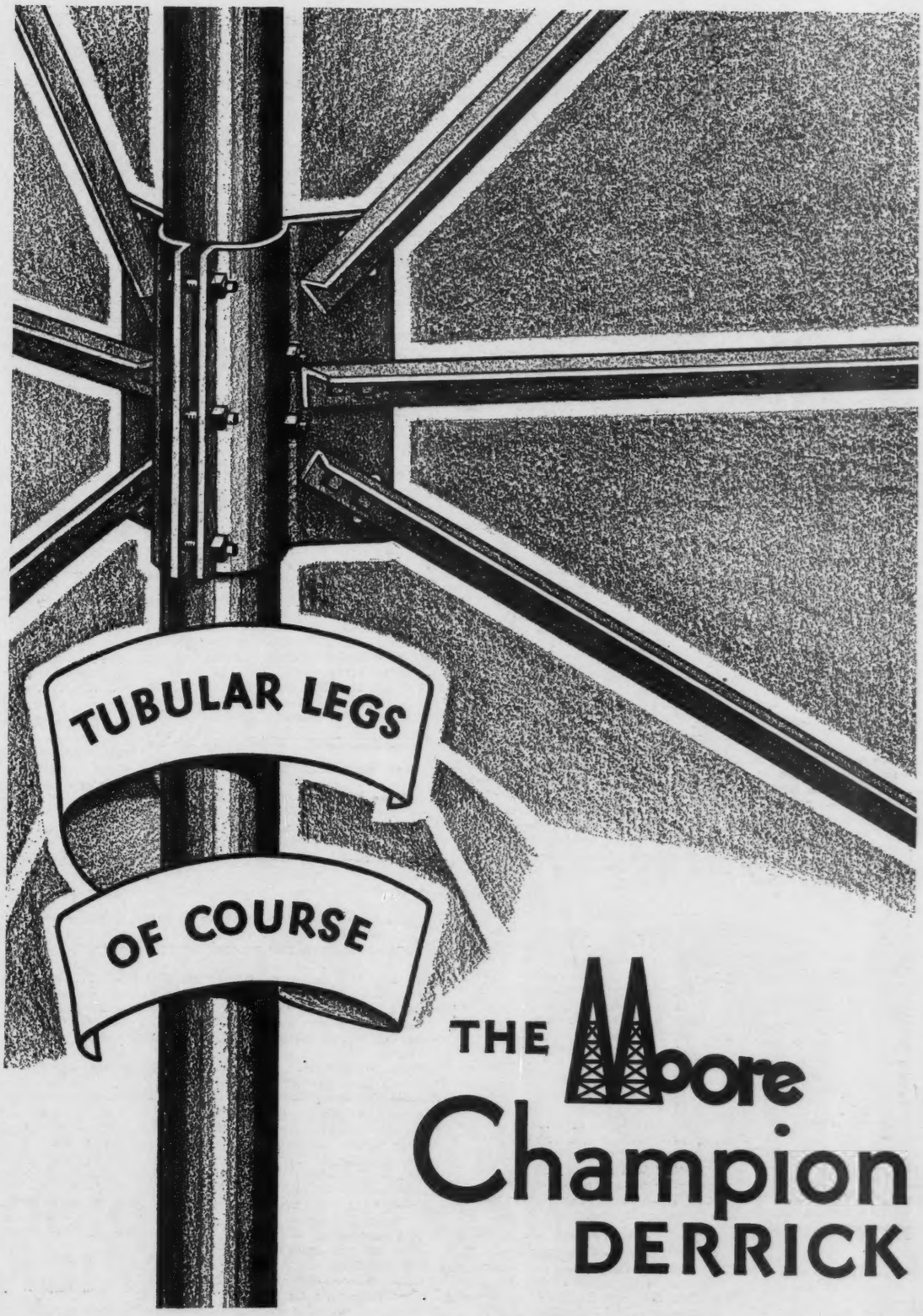
"Due to the fact that light weight and small space are of paramount importance to portable compressors, the vertical single-acting gasoline engine-driven portable compressors may have a different relation between speeds, capacities and pressures than stationary compressors.

"Small single-stage compressors of 50 cubic feet and under can be successfully operated intermittently up to 175 pounds pressure without undue or dangerous temperatures."

BOOK ON SALESMANSHIP

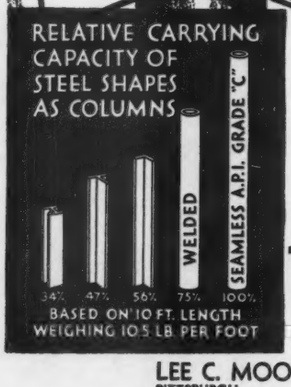
I am interested in selling gasoline and motor oils, and I would appreciate it very much if you would give me a list of reliable textbooks on this subject which would assist me.—J. E. R.

"The Merchandising of Petroleum Products," by R. A. Thomas, is suggested as a work likely to meet your needs. It can be obtained from the Homestead Publishing Co., Des Moines, Iowa. The price is $2.50.



THE Moore
Champion
DERRICK

TUBULAR LEGS OF COURSE



RELY ON MOORE LEG STRENGTH..

Assure yourself of dependable derrick service by relying on the extra strength of Moore Champion tubular legs. They are of 40-50 carbon, seamless steel—galvanized inside and outside.

STRONG CONNECTIONS . .

The Moore Clamp is the key to the efficient use of tubular legs. Leg sections, which are positively aligned at their joints, are connected with a vise-like grip by this clamp. Bolts through the clamping flanges tighten the clamp on the leg sections, and through-bolts prevent the sections from being pulled out. By means of automatic welding, the Moore clamp is made from rolled steel plates into a single rigid unit. Its high efficiency has been demonstrated by tests and by field service.

THE Moore Champion DERRICK

Moore ALL STEEL RIG EQUIPMENT

LEE C. MOORE AND COMPANY, INC.
PITTSBURGH Established 1907 TULSA
New York Offices
Oilfield Equipment Co., 30 Church Street, New York, N. Y.
DALLAS, TEXAS WICHITA, KANSAS CASPER, WYO.
SHREVEPORT, LA. HOUSTON, TEXAS
Stocks in All Principal Fields

Best Well in the Pecos Valley Pool

Ector County's Most Interesting Test Nearing Completion May Extend Pool. Another Gas Showing in Gaines County Test

By L. E. Bredberg
Fort Worth Bureau, The Oil and Gas Journal

FORT WORTH, Tex., Mar. 3.—An interesting feature for the week in Pecos County was Black and Dittman's No. 1 Pecos Valley Oil Co. well, 160 feet from the southwest and southeast lines of their lease in Section 34, Block 3, H. &T.C. Survey, in the northern part of the field, 1 mile north of the discovery well. This well came in making about 9 bbls. an hour with 10,000,000 feet of gas after topping the first gas sand at 4,175-98 feet and encountering an increase at 1,530-33 feet. It was then the best well of the Pecos Valley Pool, but had increased to a high mark of 303 bbls. in 24 hours on February 26, testing 18,000,000 feet of gas. Total depth is 1,533 feet.

A disappointment was marked up in Section 105 by Cranfill and Reynolds in their No. 1-B Masterson test, in the south half of the section, approximately 1½ miles south of their small producer in Section 104, H.&G.N. Survey. This second test started flowing sulphur water from lime at 1,585-87 feet and was shut down at the latter depth. The discovery well of this area, their No. 1 Masterson in Section 104, continues to produce about 35 bbls. per day.

Arkansas Fuel Oil Co.'s No. 1-A University, in the SW, Section 32, Block 16, southeast of the Taylor-Link Pool, is shut down in lime at 1,652 feet. It topped the first pay at 1,529 feet and the second pay at 1,635 feet, encountering an increase at 1,650 feet. It flowed a total of 40 bbls. in three heads during a 24-hour period.

Southern Crude Oil Purchasing Co.'s No. 1 McKenzie, in the northeast part of Section 10, Block 604, G.C.&S.F. Survey, Pecos County, approximately 3 miles south of the Taylor-Link Pool, is now drilling at 1,605 feet and the gas has decreased to about 1,000,000 feet. It was formerly making an estimated amount of 8,000,000 feet after topping a gas sand at 1,492 feet.

Ector County

The most interesting drilling well of Ector County is perhaps the Llano Oil Co.'s No. 1 Midland National Bank, in the NW cor., Section 18, Block 44, Township 3s, T.&P. Survey, approximately a mile east of production in the Penn Pool. This test is now drilling below 3,675 feet in hard lime, probably reaching completion this week. Completed as a producer, it will extend the pool a mile east and about a half mile to the south.

The Texas Pacific Coal & Oil Co. made an interesting location in Ector County on the McKenzie ranch, 1,650 feet from the south and 330 feet from the east of Section 28, Block 45, Township 2s, T.&P. Survey, approximately 2 miles northwest of the nearest production in the Penn Pool.

Gaines County

Cranfill & Reynolds and Louisiana Oil & Refining Co.'s No. 1 Ralph, in the SW, Section 7, Block A-28, P.S.L. Survey, Gaines County, is now drilling below 4,710 feet with another small showing of gas at 4,700 feet. Many have been watching this test for it lies almost half way between the Deep Rock Oil Co.'s producer in Andrews County and production in the Hobbs high area in Lea County, New Mexico.

Winkler County Up

Winkler County production jumped about 2,000 bbls. this week over the previous week's daily average, possibly due to the deepening of several wells in the pool. Republic Production Co.'s No. 1 Hendricks, in Section 45, Block 26, was one of the wells which helped swell production in the field. It was formerly producing the small amount of 15 bbls. daily and 99 per cent water. It is now producing 1,020 bbls. plus 4 per cent water. Former total depth was 2,870 feet, and present total depth is 2,995 feet. An increase was found at 2,993-95 feet.

Southern Crude's No. 4, tract 90, was deepened from 2,801 feet to 2,847 feet. It was making 144 bbls. and 50 per cent water, but deepening brought about an increase to 1,850 bbls. The increase was registered at 2,828-46 feet. Gulf Production Co.'s No. 28 Hendricks was deepened from 2,590 feet to 2,607 feet and made 1,412 bbls., plus 90 per cent water. It was formerly making all water. Many wells can be deepened in the field with encouraging effect, but many others will not be benefited due to encountering more water. Many have been deepened with good results in the past.

Shipley Pool

Penn and Atlantic Oil Producing Co.'s No. 2 Bennett in Section 16, Block 34, H.&T.C. Survey, an offset to their No. 1 Bennett discovery in this area, northwest of the Shipley Pool, Ward County, is shut down at 2,610 feet to shoot. It topped the sand at 2,345 feet and had a show of oil and gas at 2,347 feet. In 12 hours it filled up only 150 feet, but a shot will no doubt break the pay stratum and bring in a small well for the area.

Shell Petroleum Corp.'s No. 1 Owens in Section 16, in the Shipley Pool, is still drilling, last report giving it below 4,003 feet, swabbing 37 bbls. of oil per day. The last increase in oil was found at 3,023-32 feet, far below the regular Shipley pay horizon.

Deep Test in Irion

C. H. Williams and others' No. 1 Ash, in the C Section 20, Washington County Survey, Irion County, is now the deepest drilling well in West Texas outside of the Big Lake Pool, Reagan County. It is drilling at 7,700 feet in black lime.

Big Lake Oil Co.'s No. 3-C, Reagan County, the deepest producer of the Big Lake Pool, is still standing at 8,540 feet, but as soon as it is thoroughly cleaned out it will be deepened. The top of the deep pay in this new well is 8,380 feet.

Cranfill & Reynolds have announced an interesting wildcat test for the central part of Crane County. It is on the Tubb's ranch, 330 feet from the south and east lines of the NE Section 8, Block B-27.

One of the best wells completed in Winkler County for a long time is Republic Production Co.'s No. 1-A Grisham & Hunter. It was completed for an initial production of 6,010 bbls. of pipe line oil at a total depth of 2,995 feet. It topped the pay at 2,800 feet, encountered an increase at 2,865 feet, and struck a second pay at 2,941 feet and another increase at 2,993 feet.

Glasscock Wildcat

The California Co. completed its third wildcat test on the Currie ranch in northern Glasscock County this week. This test is 990 feet from the north and 2,310 feet from the east of Section 219, Block 29, W.&N.W. Survey, approximately 5 miles southeast of the Settles Pool. It was abandoned at a total depth of 3,671 feet. A small showing of oil was found from 3,472-3,502 feet, and the well was shot with 20 quarts from 3,056-70 feet, but with no results.

W. C. Clark's No. 2 Newman, 150 feet from the north and 2,090 feet from the east line of Section 52, Block 18, T.&P. Survey, Jones County, a semiwildcat northeast of the Bickley Pool, encountered lime at the Noodle Creek horizon from 2,529-31 feet with an oil show with water, and lime from 2,531-33 feet with an oil and gas show. A swab test is now being made after the hole filled with 37 gravity oil. It is estimated good for 75 bbls. of oil per day.

Grisham & Hunter and others are rebuilding a derrick and clearing away the debris around their No. 1 Seay in the SW Section 16, Block 59, Township 7, T.&P. Survey. The rig burned when an estimated 5,000,000 feet of gas was struck at 2,995 feet. It is to be deepened to test the gas, and lower strata. Tools are still in the hole and will have to be fished out before drilling is resumed. The gas is now exhausted or has been bridged off by the tools and the fire.

Coke County Well

The Mid-Kansas Oil & Gas Co.'s No. 1 Lackey, in the SW cor., Section 272, Block 1-A, Coke County, is still making some water from total depth of 3,763 feet to where it was plugged back from 4,255 feet. It has pumped as high as 15 bbls. of oil with 60 bbls. of water, but it seems unlikely a commercial well can be made out of it.

Fisher and Jones County pipe line runs will be curtailed by the Humble Pipe Line Co. to two-thirds of the present production. Jones County's present production is around 2,180 bbls. daily while Fisher County produces about 1,220 bbls. per day. Humble is the only purchaser in these counties.

Crude oil from the Penn Pool, Ector County, has been found to be especially good for making high grade specification gasoline with antiknock qualities. It tests 33.7 gravity with 2.61 per cent sulphur, and 33 gasoline content. Kerosene content is 7 per cent.

New Umpire in Winkler

R. B. Capers has taken over the duties as proration umpire for the Railroad Commission in Winkler County, starting March 1. He succeeds Reed Alsobrook, who resigned to go into business for himself. Mr. Alsobrook will have offices at Houston, Tex.

NORTH TEXAS PRODUCTION
Week ending February 29

County—	Wells	Prod.
Andrews County	1	190
Crane County	334	36,130
Crockett County	48	1,700
Fisher County	7	1,120
Ector County	8	1,050
Garza County	5	45
Glasscock and Howard	487	37,325
Jones County	73	2,120
Loving County	20	1,350
Mitchell County	143	2,405
Pecos County	414	140,515
Reagan County	253	16,755
Runnels County	3	15
Scurry County	5	20
Upton County	253	9,200
Ward County	23	1,535
Winkler County	606	91,425
Total this week	2,685	342,895
Total last week	2,677	338,666
Difference	8	4,229

WILDCAT OPERATIONS IN WEST TEXAS

Week Ended March 3

Company, farm and location—	Remarks—
ANDREWS COUNTY	
Deep Rock Oil Co. et al's No. 1 Mathis, 990 ft. from S and W, Sec. 4, Blk. A-46, Public School Land	Rigging up.
Deep Rock Oil Co.'s No. 1 Miles, 990 ft. S, 1,650 ft. E of NW cor. Sec. 22, Blk. A-46, School Land	Spudding.
Deep Rock Oil Co.'s No. 1 Ogden, 2,310 ft. E, 330 ft. S, Sec. 6, Blk. A-46, Public School Land	Top pay 4,345 ft.; top lime 4,050 ft.; averaging 200 bbls. per day; total depth 4,428 ft.; est. 200 ft. water in hole 4,414-28 ft.
Fuhrman Pet. Corp.'s No. 1 Ford, 440 ft. from S and 2,200 ft. from W of Sec. 16, Blk. A-43, Public School Land	Location.
Deep Rock Oil Co. et al's No. 1 King, 330 ft. from N and 2,310 ft. from E, Sec. 11, School Blk. A-46	Drlg. 650 ft.
BORDEN COUNTY	
Moncrief et al's No. 1 Munger, 1,980 ft. from N and E, Sec. 15, Blk. 31, Twp. 4-N, T.&P.R.R. Sur.	Drlg. 2,830 ft.
Phillips et al's No. 1 Goode, 330 ft. N and E of SW cor. SE of Sec. 46, Blk. 33, Twp. 4n, T.&P.R.R. Sur.	Rig.
Teas & Wheeler's No. 1 Long, 1,320 ft. N and E of Sec. 27, Blk. 30, T.&P. Sur.	Top salt 1,080 ft.; shut down 2,540 ft.
BREWSTER COUNTY	
E. W. Bateman et al's No. 2 Nevill, 2,000 ft. S and W line of Sec. 62, Blk. 13, G.H.&S.A.R.R. Sur.	Shut down 3,002 ft.
Brewster Oil Co.'s No. 1 fee, 2,640 ft. S and 2,598 ft. E of NW cor., Sec. 45, Blk. G-15, G.C.&S.F. Sur.	Fishing 1,935 ft.
Forrest Oil Co.'s No. 1 Skinner, C SW SE, Sec. 100, Blk. 2, G.C.&S.F. Sur.	Shut down 1,175 ft.
Trans-Pecos O. & G. Co.'s No. 1 Jones, 920 ft. from N and 2,500 ft. from E of Sec. 18, Blk. G-15, G.C.&S.F. R.R. Sur.	Drlg. 1,875 ft.
Van McPhail's No. 1 McIntyre, SE cor., Sec. 59, Blk. 352, 7 mi. S of Alpine	Shut down 1,740 ft.
COKE COUNTY	
Cates & Fitzhugh's No. 1 Mimms, 660 ft. N and W of SE cor. Sec. 39, Blk. W, T.&P.R.R. Sur.	Location.
Lipan Oil Co.'s No. 1 E. C. Rawlings, Sec. 390, Blk. 1-A, H.&T.C. Sur., elev. 2,750 ft.	Shut down 2,892 ft.
Mid-Kansas Oil Co.'s No. 1 W. E. Lackey, 330 ft. N and E of SW cor., Sec. 272, Blk. 1-A, H.&T.C. Sur.	Pay 3,755-56 ft.; total depth 4,250 ft.

(Continued on Page 209)

WEST TEXAS DISTRICT

Crane County

Magnolia Petroleum Co. and Hardwick's No. 18 University had 320 bbls. oil at total depth of 3,006 feet, top pay 2,870 feet.

Glasscock County

California Co.'s No. 3 Currie was dry and abandoned at 3,671 feet, had show oil 3,472-3,502 feet and shot 20 quarts from 3,056-70 feet with no results.

Howard County

Group No. 1 and Continental's No. 5 Overton had top pay at 2,174 feet, total depth 2,237 feet, proration allowance for 24 hours was 303 bbls. Group No. 1 and Continental's No. 10-A Settles was dry and abandoned at 2,850 feet. Magnolia Petroleum Co.'s No. 19 D. Roberts had top pay 2,482 feet, increase 2,550 feet, shot 260 quarts from 2,450-70 feet, initial production 25 bbls. first 24 hours, total depth 2,600 feet. Moody Corp.'s No. 4 Kloh and others had top pay 2,480 feet and after plugging back from 2,519 to 2,505 feet pumped 20 bbls. oil and 8 bbls. water. Plymouth Oil Co.'s No. 4 Abrams had 20 bbls. oil, 15 per cent water, from top pay 2,480 feet, total depth 2,519 feet. Ward Oil Co.'s

(Continued on Page 205)

New Find in Montague County, Texas

New Tests in Palo Pinto County. Another Wildcat in Young County Makes 108 Bbls. Initial. Gray County Proration Falls Short

By L. E. Bredberg
Fort Worth Bureau, The Oil and Gas Journal

FORT WORTH, Tex., Mar. 3. — A new find was registered in Montague County this week in Bridwell Oil Co.'s No. 1 J. S. Dennis, in the southern part of the F. Robertson Survey, Abstract 620. It encountered a sandy lime at 1,674-1,730 feet and a broken oil sand at 1,730-42 feet filling up 300 feet with oil in two hours. There are approximately 9 feet of cavings in the hole and 5⅜-inch casing with liner will be run and the hole cleaned out. The oil is of a very dark color testing 29 gravity.

The Transcontinental Oil Co. took a block of 1,160 acres north of Amerada and Prairie Oil & Gas Co.'s producer on the Vick farm in northern Palo Pinto County in the L. J. Pitts Survey, and will drill one deep test or two shallow tests on the block. Kidney and Lester retained one-half interest in the block. Location for a well will probably be made in the SE cor., Section 857. A test is also to be drilled on acreage to the south on the S. Borden land. The Amerada-Prairie discovery was brought in December, 1929, for an initial production of around 300 bbls. and is producing to date close to 200 bbls., the Prairie Pipe Line Co. running the oil.

Young County Wildcat

The Nimrod Oil Co.'s No. 1 W. D. Hall, 450 feet from the north and 150 feet from the east of the north 80 acres of the south 100 acres of Section 167, T.E.&L. Survey, Young County, is another wildcat, located northwest of the town of Orth, just west of the Consolidated Oil Co.'s discovery which is estimated good for around 30 or 40 bbls. The Nimrod discovery came in for an initial production of 108 bbls. from oil sand found at 877-92 feet.

Another meeting of Gray County operators will be held at Pampa to discuss further proration of the flush areas of that county. For awhile proration in that county was voluntarily adhered to by the majority of operators and companies, with a few of them holding out, but during the past few weeks the proration plans have rather fallen short in holding back drilling and production, and it is hoped that the operators will again co-operate to bring down production in this county. This week's daily average production showed a gain of over 2,000 bbls. over the previous week's daily average. This week's average was 54,805 bbls.

Callahan Gasser

In Callahan County, Gibson and Johnson's No. 2 Jackson, near the new Jackson Pool in the northern part of the county, has 2,000,000 feet of gas from 942-51 feet and has been completed as a gasser with the Lone Star Gas Co. taking the gas. This is one of three wells which Gibson and Johnson agreed to drill on a block obtained from The Texas Company. Materials are now being moved in for a third test which is to be located in the SE cor. SW SW, Section 16, E.T.R.R. Survey. The first test drilled was dry. The third test will be carried to the Cooke sand. The pool was opened by E. P. Campbell on the Jackson farm.

In the same county, the States Oil Corp.'s No. 1 Ross, in the C NE NE, Section 98, B.B.B.&C. Survey, tested 4,675,000 feet of gas on February 26, with 430 pounds rock pressure with B.t.u. of 865. It is reported that the Lone Star Gas Co. will connect with the well and take the gas. Culbertson Brothers have made a north offset to the gasser.

The George Pool in Brown County produced 894 bbls. from 47 wells on February 26.

In Eastland County, J. L. Hamon, Jr., purchased the Frank Good producing lease comprising a square of 171 acres out of the southwest portion of the J. R. Stubblefield farm, being all of the 120 acres of the SE, Section 56, B.B.B.&C. Survey, except the northwest of the southeast of Belva's one-fourth interest in the SE SW, Section 56. There are five wells on the lease, Nos. 2, 3 and 6 are plugged. Daily production from the producing wells is 100 bbls.

Third Producer in Jack

Prairie Oil & Gas Co.'s No. 1 Munson, in Section 3, B.S.&F. Survey, east of the Buttram Pool in Jack County, was completed this week for an initial production of 150 bbls. at a total depth of 4,748 feet. Top of the pay of this, the third deep producer in the county, was found at 4,691 feet. It is an assured fact that many other wells in the county will be carried to greater depths in an effort to pick up this new deep pay, especially if they miss the shallow pay zones. Other tests may be drilled with the expectations of going to the deeper pay in an effort to pick up production.

Lone Star Gas Co.'s No. 1 McElvain, in Stephens County, was completed for a 50-bbl. well with 140 bbls. of water and 4,000,000 feet of gas per day during the week. This well first came in as a gasser, igniting and burning down the rig.

Lone Star Gas Co.'s No. 3 Brooks, in the southeast part of Section 54, Block 7, T.&P. Survey, in the extreme southwest corner of Stephens County, was completed this week at a total depth of 3,375 feet, estimated good for 3,500 bbls. per day. Top of the Caddo lime, from which it is producing, was found at 3,350 feet. It is pinched to 40 bbls. per hour, and the United Producers Pipe Line Co. is taking the oil. It is surrounded by several gas wells, some of them making a little oil, but this is the first big oil well found in this area, and was rather a big surprise to the company.

RANGER DISTRICT

Callahan County

H. D. Creath's No. 1 Hutchinson was dry and abandoned at 1,251 feet. Humble Oil & Refining Co.'s No. 1-F Jackson was dry and abandoned at 1,200 feet. Mook-Texas Oil Co.'s No. 1 Wilson had sand at 1,599-1,611 feet with estimated 10 bbls. oil. It was plugged and abandoned at total depth 1,630 feet. Mortimer Oil Corp. and others' No. 1 Cutbirth was dry and abandoned at 1,516 feet. States Oil Corp.'s No. 1 Ross had 4,765,000 feet gas from sand 1,258-67 feet with 430 pounds rock pressure, total depth 1,267 feet.

Coleman County

Donnelly and others' No. 1 Mead was dry and abandoned at 2,535 feet. Continental Oil Co. and others' No. 8 Overall was plugged back from 2,527 feet to 2,525 feet, top pay 2,508-25 feet, and had initial production 3 bbls. oil, 6 bbls. water and 1,000,000 feet gas. Lloyd Oil Corp.'s No. 5 Bartholemew was dry and abandoned at 2,115 feet. Meredith & Benton's No. 1 Weir was dry and abandoned at 2,295 feet. Mid-West Exploration Co.'s No. 1 Hinds was dry and abandoned at 2,406 feet. Permian Oil Co.'s No. 1 Sealy & Smith was dry and abandoned at 780 feet. Levi Smith and others' No. 1 Switzer had initial production of 125 bbls. fluid, flowing 80 per cent oil and 20 per cent water from sand 1,439 feet, total depth 1,441½ feet. Vacuum Oil Co.'s No. 5 Weaver had initial production 70 bbls. on pump from oil sand at 1,814-26 feet, total depth 1,827½ feet.

Eastland County

I. J. Elliott's No. 1 Martin had initial production 10 bbls. from top pay 3,369 feet, total depth 3,492 feet. Humble Oil & Refining Co.'s No. 1 Whiteside had 3,000,000 feet of gas from sand at 2,651-58 feet, total depth 2,710 feet. J. E. Lewis & Co.'s No. 4 Holcomb had initial production 35 bbls. with 1,500,000 feet gas at total depth 1,347 feet, top pay 1,297 feet. Lone Star Gas Co.'s No. 1 Parmer had show oil 3,820 feet, lime 3,820-26 feet, total depth 3,878 feet, initial production 1,591,000 feet gas. Lone Star Gas Co.'s No. 3 Storm was dry and abandoned at 3,943 feet. Lone Star Gas Co.'s No. 4 Storm had initial production 3,800,000 feet of gas at total depth 3,854 feet, top pay was 3,847 feet. Shadbolt & Creighton and others' No. 1 St. John & Harrison was dry and abandoned at 3,908 feet. Southern Oil & Purchasing Co.'s No. 1 Turner was dry and abandoned at 1,286 feet.

NORTH TEXAS PRODUCTION

Week ending February 22

Panhandle District—	Bbls.
Carson County	9,365
Hutchinson County	22,525
Gray County	54,805
Moore County	740
Potter County	....
Wheeler County	615
Total this week	89,050
Total last week	89,055
Decrease	5
Wichita District—	
Archer County	17,270
Baylor County	445
Clay County	700
Cooke County	4,780
Foard County	210
Jack County	4,060
Haskell County	60
Montague County	6,335
Throckmorton County	695
Wilbarger County	27,550
Young County	8,690
Wichita County	23,950
Total this week	94,745
Total last week	96,430
Decrease	1,685
Ranger District—	
Brown County	8,215
Callahan County	3,320
Coleman County	5,000
Comanche County	410
Palo Pinto County	650
Eastland County	5,065
Shackelford County	7,970
Stephens County	5,615
Total this week	36,245
Total last week	36,545
Decrease	300
Grand total this week	220,040
Grand total last week	222,030
Decrease	1,990

Palo Pinto County

Profit Oil Co.'s No. 1 Dalton had initial production of 7 bbls. day after shot of 14 quarts in sand at 1,225-41 feet, total depth 1,241 feet. Richardson and others' No. 1 Holt was dry and abandoned at 1,540 feet.

Shackelford County

Humble Oil & Refining Co.'s No. 1 Ackers had initial production of 15 bbls. at total depth 1,482 feet, top pay 1,476-80 feet. C. Morton's No. 1 Davis was dry and abandoned at 1,670 feet. Roeser &

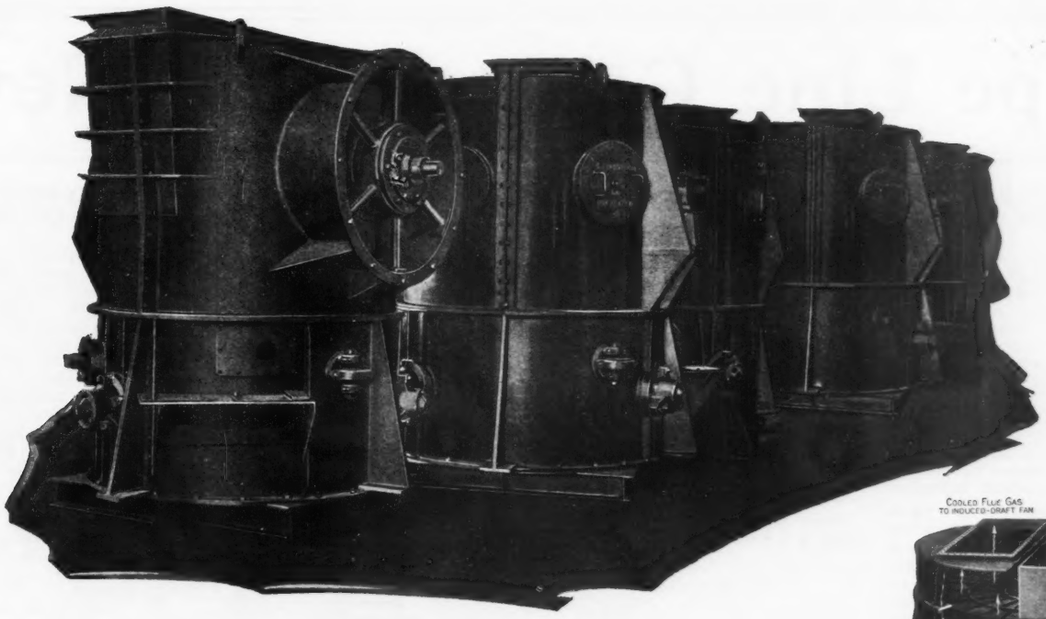
(Continued on Page 205)

WILDCAT OPERATIONS IN TEXAS PANHANDLE

Week Ending March 3

Company, well, farm, name, section and block—	Remarks—
CARSON COUNTY	
Champlin Ref. Co.'s No. 5 McConnell, 990 ft. S line, 330 ft. W line, N 120 ac., NW, Sec. 67, Blk. 4, I.&G.N. Sur.	Rigged up and S.D.
Danciger O. & R. Co.'s No. 1 Block, 330 ft. N and E lines, Sec. 112, Blk. 4, I.&G.N. Sur.	S.D. 2,985 ft.
Delmar Oil Co.'s No. 6 Noel, 330 ft. S and W, NE cor. W½ SE, Sec. 198, Blk. 3, I.&G.N. Sur.	S.G. 3,000-10 ft.; S. D. 3,131 ft.
Cockrell-McIlroy Oil Co.'s No. 1 Eller, 330 ft. S and W, NE cor. NW, Sec. 200, Blk. 3, I.&G.N. Sur.	Location.
Cockrell-McIlroy Oil Co.'s No. 1 Simms, 330 ft. S and E, E 140 ac., N 160 ac., S 320 ac., Sec. 11, Blk. 7, I.&G.N. Sur.	Location.
Empire G. & F. Co.'s No. 1 Thorp, C NW, Sec. 26, Blk. T, A.B.&M. Sur.	U.R. 6-in. csg. 3,446 ft; T.D. 3,512 ft.
Gulf Prod. Co.'s No. 1 Burnett-C, C SE SE, Sec. 35, Blk. 4, I.&G.N.R.R. Sur.	Drlg. 1,250 ft.
H.A.M. Oil Co.'s No. 1 Cooper, 330 ft. S and W, E½ NE, Sec. 5, Blk. 9, H.&G.N.R.R. Sur.	T.D. 3,105 ft.; T.D. 3,102 ft.; 2,000 ft. oil in hole.
McClintock et als' No. 2 Garner, 330 ft. W and S of E 55 ac. of N 80 ac., NW, Sec. 105, Blk. 4, I.&G. N.R.R. Sur.	Rigging up.
Osborne et als' No. 3 Percival, 330 ft. N and W, SE cor. E½ NE, Sec. 199, Blk. 3, I.&G.N.R.R. Sur.	Rigging up.
Pansota Oil Co.'s No. 1 Block, 330 ft. S and W, NE cor. SW, Sec. 111, Blk. 4, I.&G.N.R.R. Sur.	S.D. 3,060 ft.
Phillips Pet. Co.'s No. 1-A Garner, 430 ft. S line, 330 ft. W, Sec. 114, Blk. 4, I.&G.N. Sur.	Location.
Prairie O. & G Co.'s No. 2 Nail, 330 ft. N and W lines, N½ E½ SE, Sec. 198, Blk. 3, I.&G.N. Sur.	10,000,000 ft. gas 2,830-2,985 ft.; S.D. 3,123 ft.
Ryan Cons. Oil Co.'s No. 7 Block, 330 ft. N, 990 ft. W, SE cor. NE, Sec. 111, Blk. 4, I.&G.N.R.R. Sur.	S.D. 3,062 ft.
Shell Pet. Corp.'s No. 1 Percival, 330 ft. N and E, SE. Sec. 199, Blk. 3, I.&G.N. Sur.	S.D. 600 ft.
Skelly Oil Co.'s No. 19 Schafer, 330 ft. N, 990 ft. E, SW cor. NE, Sec. 198, Blk. 3, I.&G.N. Sur.	6,000,000 ft. gas 2,895-2,970 ft.; S. D. 3,100 ft.
Skelly Oil Co.'s No. 20 Schafer, 330 ft. N, 990 ft. W, SE cor. N½, Sec. 198, Blk. 3, I.&G.N. Sur.	S.D. 3,090 ft.
L. W. Timm's No. 2 Garnet (White Deer), 330 ft. S and W, NE cor., Sec. 104, Blk. 4, I.&G.N.R.R. Sur.	S.D. 1,008 ft.
CASTRO COUNTY	
Colorado O. & R. Co.'s No. 1 Slemmons, SW cor., Sec. 73, Blk. M-17, B.S.&F. Sur.	Rig blown down.
Mystery Oil Co.'s No. 1 J. I. Crum, SE cor. NE, Sec. 333, Blk. M-6, S.K.&K. Sur.	S.D. 510 ft. for csg.
CHILDRESS COUNTY	
Continental Oil Co. and Sun Oil Co.'s No. 1 Johnson, 660 ft. NE, Sec. 580, Blk. H, W.&N.W. Sur.	Drlg. 980 ft.
C. L. Sloane et als' No. 1 B. P. Smith, Sec. 49, F. P. Knott lands	T.D. 5,000 ft; C.O.
COCHRAN COUNTY	
Westbrook et als' No. 1 Slaughter, 400 ft. S and E, Labour 67, League 118, Knox Co. School lands	T.D. 5,036 ft.
COLLINGSWORTH COUNTY	
Sharp Bros.' No. 1 Aldons, 410 ft. N, 330 ft. E, Sec. 96, Blk. 16, H.&G.N.R.R. Sur.	Run. 15½-in. csg; T.D. 312 ft.

(Continued on Page 212)



To recover waste heat from flue gas at 850 deg. to 900 deg. temperature

THESE five Ljungstrom Air Preheaters are to be installed on refinery distillation systems in plants of one of the leading producers in the California field, to raise the temperature of the combustion air from 60 deg. to between 450 and 600 deg. The reduction in fuel consumption so effected will repay the cost of the preheating apparatus many times over, and will produce sufficient net annual money saving to make the Ljungstrom Preheaters probably the most profitable apparatus in the plant.

In 1929 Ljungstrom Air Preheaters were operating on stills or refinery processes in the leading refineries in New Jersey, Illinois, Indiana, Wyoming and California.

The Ljungstrom Preheater was chosen for all of these important refinery units due to the fact that the exclusive Ljungstrom continuous regenerative counterflow principle of heat recovery afforded the means for obtaining the highest heat recovery in a unit of the smallest size, smallest weight and lowest initial and operating cost. The high dependability and continuous operation of these units results in the highest net return on the investment.

The Ljungstrom is the only internationally used air preheater with producing factories in six countries and satisfactory installations scattered all over the globe.

Over 800,000 boiler hp. in service in the U. S. A.

Write for literature, performance data and guarantees

THE AIR PREHEATER CORP., 40 E. 34th St., New York

Works: Wellsville, N. Y.; Agents in

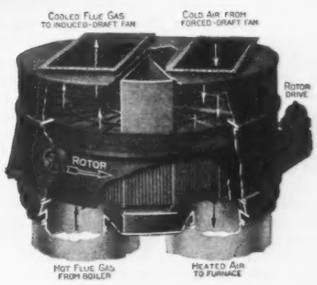
Philadelphia	Charlotte	St. Louis	Kansas City	Los Angeles
Boston	Detroit	New Orleans	Houston	San Francisco
Buffalo	Cleveland	Pittsburgh	Denver	Tacoma
Chicago	Minneapolis	Cincinnati		

Canada: Lammers & Maase, Ltd., Montreal and Vancouver

Ljungström AIR PREHEATER

REG. U.S. PAT. OFF.

CONTINUOUS REGENERATIVE COUNTERFLOW

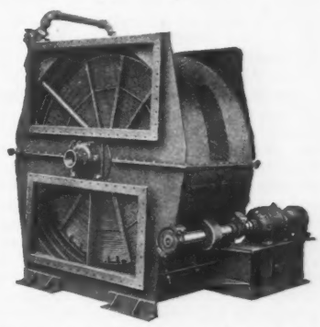


Type CANX for Use with Independent Forced-draft and Induced-draft Fans

Operated with rack and pinion drive, and has a center thrust bearing in the cold air side of the top housing. For boiler units of 1000 hp. and over.

Type CAN Ljungstrom Air Preheater with Integral Forced-draft and Induced-draft Fans

The scroll fan housings in connection with axial fan wheels greatly increase fan capacity and decrease operating power requirement.



Type CHNX Ljungstrom Horizontal Air Preheater for Use with Independent Forced-draft and Induced-draft Fans

Made in three constructions for maximum flue-gas temperatures of 1000° F., 1200° and 1600°, respectively. Especially desirable for high temperature industrial work and for boiler rooms in which horizontal operation effects savings in space, building construction, ducts and fan operation.

Pipe Line Construction News

UNITED GAS CO. BUYS W. F. MORGAN HOLDINGS

HOUSTON, Tex., Mar. 3.—The Moody-Seagraves interests through the United Gas Co. and its subsidiaries have completed the purchase of the entire holdings of the W. F. Morgan interests at Refugio. The transaction included the Gulf Coast Pipe Line Co. and its ship terminal at Port Aransas, and the properties of the Morgan Oil Corp. at Refugio. The transaction involved approximately $3,500,000. The new acquisitions of the Moody-Seagraves interests for the time being will be operated individually with Mr. Morgan continuing in charge.

The Gulf Coast Pipe Line Co., which operates the only pipe line out of the Refugio Field, has just completed a new 8 and 10-inch loop to its 6 and 4-inch line which extends from the field to its terminal on the coast at Port Aransas, 38 miles south of the field. The system now has a capacity of from 40,000 to 50,000 bbls. daily. The Moody-Seagraves interests will take over crude delivery contracts of the Gulf Coast Pipe Line Co. which include one for 10,000 bbls. daily to the Cities Service Oil Co., one for 5,000 bbls. daily to The Texas Company and a third for 6,000 bbls. daily to the Humble Oil & Refining Co.

Properties of the Morgan Oil Corp. purchased include approximately 2,500 acres in the Refugio Field with approximately 7,500 bbls. daily production.

Tank farm construction started by the Morgan companies will be completed by the Moody-Seagraves interests as well as a 6-inch line for which surveys have been completed from the Port Aransas terminal to Humble Pipe Line Co.'s tank farm at Harbor Island.

The Moody-Seagraves holdings at Refugio already were the largest in the field being operated through two companies, the Houston Gulf Gas Co. and the Union Producing Co., the former taking the gas production and the latter the oil.

MANUFACTURED GAS COMPANIES PROTEST

PITTSBURGH, Pa., Mar. 1.—S. R. Zimmerman of Lancaster has filed a protest with the Public Service Commission that the sale of Standard Oil Co. pipe lines to natural gas companies giving these companies entrance to the East, threatens the existence of many manufactured gas concerns in the formation of a gas monopoly.

Zimmerman's contention developed in a hearing before Public Service Commissioner Y. Ray Shelby, when the Lancaster attorney protested against the sale of facilities of the Southern Pipe Line Co. to the Manufacturers Light & Heat Co.

The Southern company is a subsidiary of Standard Oil and the Manufacturers' concern is a Columbia Gas & Electric Co. subsidiary. The latter company, Zimmerman said, is now in large control of consuming gas territory in many states and the control is to be greatly extended.

Zimmerman, representing a half dozen private gas companies in Lancaster city and county, told the commission of his clients' desire to have the commission indicate the status of the gas companies purchasing oil lines so that these would not be used to raid their territory. He pleaded that the purchase of the oil lines gives the gas companies pipe line facilities to the East and threatened the entire eastern manufactured gas business.

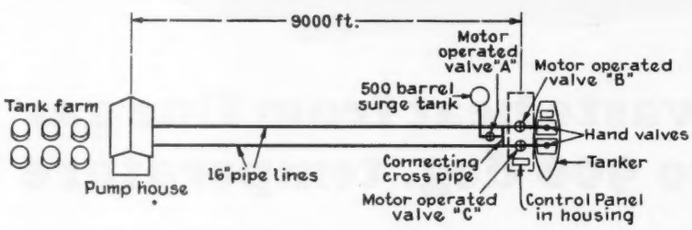
Commissioner Shelby decreed the rulings which Zimmerman sought to obtain here were subjects for the consideration of the entire commission.

PIPE LINE COMPANY ADOPTS UNIQUE DEVICE FOR LOADING OIL TANKERS

By A. C. D. Moir
Industrial Engineering Department, General Electric Co.

An interesting application of automatic control of oil pumps and motor-operated valves was made recently by a pipe line company which has a tank farm and loading dock on the Eastern Seaboard. A pump station used for loading tankers of an oil refining company is 9,000 feet from the dock to which the tankers tie up. There are two 16-inch pipe lines from the pump station to the loading dock.

Near the dock end of the pipe lines there is a connecting cross pipe linking the two lines with a "T" leading to a motor-operated valve "A" (see sketch). Thence there is a pipe to a 500-bbl. surge tank. At the dock end of the lines are two motor-operated valves "B" and "C." When a tanker is being loaded two 50-foot lengths of flexible hose are used to run from the motor-operated valves "B" and "C" on the dock to the tanks on the ship. At the discharge ends of the hose are hand valves. Often a deckhand may close these when the tanks are full. It was necessary to provide automatic control to close down the pumps and shut the motor-operated valves "B" and "C" so that the momentum of the oil in the line would not build up too high a pressure in the hose, which might break the hose and scatter oil over the ship.



Equipment Required

The equipment required was two 12-inch bronze mounted valves suitable for motor operation, complete with motors, magnetic reversing switches, limit switches and push button station for each valve (designated "B" and "C"); one 8-inch bronze mounted valve, complete with motor, magnetic reversing switch, standard push-button station, master push-button station, Mercoid pressure governor switch, limit switch (designated "A"); one control panel, 20 by 16 inches, with inclosing case, mounting; three interlocking relays; one time-delay relay; connecting studs; wiring, and one relay for operating motor control in pump station.

Before starting the system the hand-operated valves at the ends of the flexible hose on the deck of the tankers are opened.

On pressing the "start" button of the master "start-stop" push-button station, the following sequence of operations occurs: (a) Motor-operated valves open; (b) Pumps in pumping station start.

"Stop" Button Sequence

On pressing the "stop" button, the following sequence of operation occurs: (a) Motor-operated valves "B" and "C" close; (b) motor-operated valve "A" opens; (c) pumps in pumping station stop; (d) motor-operated valve "A" closes.

If a deckhand closes the hand valves on the deck, the same sequence of operation will occur, the sequence being started by the operation of the pressure governor.

It was recommended that a time interval occur before motor-operated valve "A" closed. By using an inclosed surge tank an air-cushion effect could be obtained which would damp out hammering in the pipe line. After the pumps close down and the main valves close, the oil in the surge tank should drain back into the line unless the pump station is at a higher level than the surge tank.

If this scheme should be unsuitable owing to the last condition or for any other reason, the time-delay relay can be adjusted to close the valve "A" as soon as the main valves "B" and "C" are closed. The draining of oil from the surge tank must then be taken care of by a separate pump system.

SWEETGRASS LINES

CASPER, Wyo., Mar. 1.—Two pipe lines are now being laid to the Border Field, one by the Illinois Pipe Line Co. from the new field to Sweetgrass and the other by interests allied with the Coutts refinery from the field to Coutts. The two lines will be on opposite sides of the international boundary, but will average less than a mile apart for the route. Sweetgrass and Coutts are practically one town, separated by a single street on the boundary line.

WICKETT PIPE LINE ELECTION

W. Edward Lee, attorney of Midland, Tex., was named secretary of the Wickett Pipe Line Co., the office having been created at the annual meeting of the directors. Mr. Lee is also general counsel of the company. W. B. Hassett, Tulsa, and C. R. Armstrong, Pittsburgh, Pa., were re-elected president and vice president. These two, with John M. Shipley of Midland, are the directors. Offices are at Midland, and the company has a short line running from its refinery at Wickett to the Shipley Pool in Ward County, the first line to be laid to this pool.

GAS ENGINEERS TO MEET

The spring conference of the Distribution Committee of the Technical Section, American Gas Association, will take place at the Statler Hotel, St. Louis, Mo., April 9, 10 and 11.

Gas engineers from all sections of the country are expected to be attracted to St. Louis for this gathering. Reports and papers will be presented by many men prominent in the gas industry, according to the tentative program which has been prepared under the direction of J. H. Braine, assistant engineer of the distribution department, Brooklyn Union Gas Co., Brooklyn, N. Y.

BUILD BOOSTER STATION ON COLORADO GAS LINE

AMARILLO, Tex., Mar. 3.—The Colorado Interstate Natural Gas Co., which supplies natural gas from the fields of the Texas Panhandle to various cities and towns in New Mexico and Colorado, will construct a booster station at a cost estimated at approximately $750,000 at a point about 7 miles east of Clayton, N. Mex. Location of the plant is about half-way between the Bivins Station, 30 miles north of Amarillo, and the Picketwire Station in Picketwire Canyon, Colorado. The company, with the Canadian River Gas Co., operates about 400 miles of line extending from near Amarillo up to Boulder, Colo.

B. R. Wilson, contracting superintendent for the company, estimates it will require about one year to complete the work.

Between 150 and 175 men will be employed. After the station is in operation a force of 25 men will be necessary to maintain the plant.

The main building will be of reinforced concrete and brick, 78 by 130 feet, and will house three compressors of 1,000 horsepower each. A large warehouse, a machine shop fully equipped, an auxiliary building and residences, stores and bunkhouses will be erected. There will be 10 or 12 cottages for married employes besides a dormitory for single men, a dining room and other buildings.

Three wells for supplying water are being drilled at this time. A small electric light plant will generate power for the machinery and also for domestic use.

Labor costs will be around $270,000 with the balance being expended for machinery and equipment.

PIPE LINE TO MENARD

SAN ANGELO, Tex., Mar. 1.—A franchise for 25 years to supply Menard with natural gas has been granted by the Menard City Council to J. C. Barnett and associates, who about two months ago drilled in a 4,000,000-foot gasser at 1,267 feet on the Callan City Land Co.'s holdings near Callan City.

A pipe line to Menard will be started in about four months. Meanwhile the operators will drill another test to augment their gas supply. About 400 individuals and firms have signed for service. They will pay a minimum of $2, and 80 cents for each succeeding 1,000 feet of gas.

VAN POOL LINE

FORT WORTH, Tex., Mar. 3.—It is practically an established fact now that the Pure Oil Co. will soon start the laying of a 10-inch line from its Smiths Bluff refinery to the southernmost end of its present short 10-inch line from the Van Pool, Van Zandt County, to Chandler where it is now loading out crude via tank cars, for the pool is now assuming such potentials that although the wells are closely pinched they are crowding present storage and the capacity of the loading rack, and another outlet will have to be constructed to accommodate the present producers and the new wells which will soon be completed in the pool.

SUNBURST-RED COULEE LINE

Work has been started on the oil pipe line to be built by the Ohio Oil Co. from the International refinery at Sunburst, Mont., to the Red Coulee Field. Maple Leaf Oil & Refining Co. on the Alberta side is at work on a line from Vanalta's No. 1 to Coutts. Great Northern Utilities Co. has completed survey for a light and power line to the Red Coulee Field.

The first of a series of advertisements by the Oklahoma Contracting Company showing the history and the development of the pipe line industry.

A NATIVE RUNNER MADE THE FIRST PIPE LINE FROM A BAMBOO ROD

In Upper Burma, east of the Bay of Bengal, the bare feet of native carriers for numberless centuries have trod the paths between the shallow oil wells and the river. Oil is drawn from the ground by a pulley and goatskin bucket, where it is transferred to earthenware jars, and carried on the shoulders of the runners to the river. There it is poured into the hold of the boat.

. . . Once there was a runner who grew weary of his load, who wondered if the crude oil might not be made to flow of its own gravity down to the river. From a hollow bamboo rod he made the first pipe line ever used for the transportation of petroleum. In theory it worked. In practice, it leaked at the joints. He gave up his dream, became a runner again, and his invention was buried under the dust of centuries. . . .

Altho oil was produced in Asia hundreds of years before the Christian era, methods of petroleum transportation were very primitive and makeshift until 1865 when an American laid the first successful pipe line. Fields all over the world are today connected with seaport, railroad, refinery, and civilization by oil and gas pipe lines.

Lubbub Swamp
On the Monroe-Atlanta Line

The Oklahoma Contracting Company laid the pipe from Yazoo City, Miss., to Tuscaloosa, Ala.—approximately 200 miles—for the Southern Natural Gas Corporation's 22" line from the gas fields of Monroe, La., to Atlanta.

The laying of this line thru swamps, thickly wooded sections, and over mountains was one of the most difficult jobs in pipe line history. The work was carried on in the dead of winter, yet *all requirements for completion dates were fulfilled on the contract specified time.*

OKLAHOMA CONTRACTING COMPANY DALLAS TULSA

OKLAHOMA FIELDS

(Continued from Page 66)

constitute the potential for the month of March.

Garfield County Again Looms

The discovery of gas in the wildcat drilling test in the southeastern part of Garfield County has turned the attention of the oil operators to that part of the State. The Continental Oil Co. and others' No. 1 Brown, C N half NW SW Section 1-20-4w, is located between Covington and Marshall and had 25,000,000 feet of gas at 5,095-5,117 feet. The test was drilling deeper at a total depth of 5,300 feet. The location is on a block assembled by the Marland Oil Co. (now Continental Oil Co.) about eight years ago, on which a test was drilled, No. 1 Looman, NE cor. SE Section 9-20-4w, to a total depth of 5,735 feet, where it was shut down in August, 1928. The Looman test also had several interesting showings of gas. The Garber area, which was in the limelight several years ago, is again attractive to the wildcatter. Champlin Oil & Refining Co. has a large block around the town and the first operation it is drilling is No. 1 Gibson, SW cor. SE SE Section 25-23-4w, just off the townsite. It is expected to be a Wilcox sand test. Another interesting test in the Garber district is the Shell Petroleum Corp.'s No. 1 Loomis, NW cor. Section 32-23-4w, in the vicinity of the company's No. 1 Brunken, which was drilled to a total depth of 6,140 feet and which produced 25 bbls. a day from the Wilcox sand.

The wildcats in the northwestern part of the State were nearing the deepest levels that any tests in the State have ever attempted to explore. Sinclair Oil & Gas Co.'s No. 1 Howell, C SW SW Section 14-26-24w, Harper County, was drilling at 7,538 feet. Same company's No. 1 Stewart, SE cor. SW Section 33-27-15w, Woods County, was drilling at 6,750 feet, after fishing for several weeks at 6,745 feet. Sinclair Oil & Gas Co. and others' No. 1 Cromwell, SW NW NE Section 23-28-16w, Woods County, was drilling at 4,610 feet. Prairie Oil & Gas Co.'s No. 1 Wilber, NE cor. NW Section 23-23-17w, Woodward County, was drilling at 6,170 feet. Bu-Vi-Bar Petroleum Corp. and others' No. 1 Thompson, SE cor. SW Section 10-25-15w, Woods County, was fishing at 6,104 feet. Empire Oil & Refining Co.'s No. 1 Bruce, C NE SW Section 12-25-20w, Harper County, was a rig.

Good Shallow Producers

Madill Field in Marshall County has four new producers, completed during the week. Bilbo Oil Trust Co.'s No. 2 Null, SW cor. NE NW Section 24-5s-5, pumped 200 bbls. the first 24 hours from the pay at 563-72 feet and 580-615 feet. Same operators' No. 6 Taliaferro, SW cor. NE SE Section 14-5s-5, was estimated to be a 60-bbl. producer from sand at 500-21 feet. Fleming and others' well in SW cor. SE NE Section 24-5s-5, was running tubing preparatory to pumping. The sand at 513-23 feet, 550-62 feet, 584-96 feet will be tested. F. W. Merrick's No. 12 Null, NE cor. NW NW NW Section 24-5s-5, is being put on the pump. Lee and others' No. 1 Hilburn, SE cor. NE SE Section 22-5s-5, a wildcat 1½ miles west of production, was being abandoned as a dry hole at a total depth of 720 feet. Magnolia Petroleum Co.'s No. 1 Coatesworth, SW cor. SE SE SE Section 30-5s-5, three-quarters of a mile southeast of production, was abandoned as a dry hole in shale at a total depth of 912 feet.

Carter and Stephens Counties

In northwestern Carter County, Venmex Oil Co. completed its No. 1 Spears, NW cor. SE Section 29-1s-3w, for 124 bbls. the first 24 hours. Production was found in sand at 3,908-15 feet, the total depth being 4,047 feet. Atlantic Oil Producing Co.'s No. 4 Taylor, SE cor. SW NW Section 12-1s-4w, Stephens County, was swabbing 200 bbls. a day from a series of sands between 3,000 feet and 3,814 feet.

The Palacine Field did not report any completions during the week. Wirt Franklin Petroleum Corp.'s No. 2 Brooks, SE cor. NE Section 8-2s-6w, Stephens County, was coring ahead at a total depth of 3,419 feet, with nothing showing. Same company's No. 2 Spain, SW cor. NW Section 9-2s-6w, an old producer being drilled deeper, was drilled at 3,167 feet. Same operators' No. 1 First National Bank, one-half mile northwest of production, was reaming the hole before drilling deeper at a total depth of 3,368 feet. New operations in the field were the Wirt Franklin Petroleum Corp.'s No. 3 Spain, SE cor. SW NW Section 9-2s-6w, and same operators' No. 2 J. Martin, NE cor. SE Section 9-2s-6w.

Greater Seminole Operations

The new area south of the Earlsboro pool was active during the week and reports four new locations: Continental Oil Co.'s No. 3 McGuire, NW cor. SE SE Section 24-9-5; Magnolia Petroleum Co.'s No. 4 Moore, SW cor. NE SE Section 24-9-5; Sinclair Oil & Gas Co.'s No. 2 Miller, SE cor. NW SE Section 24-9-5, and Gypsy Oil Co.'s No. 1 Miller, NE cor. SW SE Section 24-9-5. These tests were on the west side of the new south extention.

A community test south of the Earlsboro townsite drilled by Sinclair Oil & Gas Co., Carter Oil Co., Peerless Oil Producing Co. and Reese Drilling Co. had a show of oil in the Hunton and Simpson and water in the Wilcox sand. The total depth of the test was 4,375 feet, and it will be plugged back to the Hunton at 4,161-73 feet, where a showing of oil will be tested.

Wildcat Flowing 300 Bbls.

Keister & Manning's No. 1 Rowlett, SE cor. SW SE, Section 30-8-4, a wildcat south of Tecumseh, in Pottawatomie County, flowed 300 bbls. from total depth of 4,188 feet.

Bowlegs Pool has few operations at this time. Carter Oil Co.'s No. 1 Micco, NW cor. SE NW, Section 9-8-6, north of the pool was drilling at 2,615 feet. Same operator's No. 1 Nellie, SW cor. NE, Section 27-8-6, south of Bowlegs, was drilling at 3,850 feet.

Konawa production is increasing notwithstanding some dry holes were found in the area. E. L. Harris and others' No. 5 Harjoche, NW cor. SE SE, Section 8-6-6, was reported to have reached a total depth of 2,966 feet, without any signs of sand. Twin State Oil Co.'s No. 1 Charlie, NE cor. SE SW, Section 8-6-6, was underreaming at a total depth of 3,440 feet. Mid-Continent Petroleum Corp.'s No. 1 Harjoche, SE cor. NW SE, Section 8-6-6, was drilling ahead at 3,130 feet. All these are considered to be dry in the Cromwell sand.

Sinclair Oil & Gas Co.'s No 1 Johnson, NE cor. SE SW, Section 17-6-6, was completed in the past week. The well flowed 345 bbls. of oil in eight hours, from a total depth of 2,880 feet in Cromwell sand. Gypsy Oil Co.'s No. 1 in the NW cor. NE NE, Section 17-6-6, flowed 342 bbls. on the gauge of February 28. The present total depth was 2,908 feet, and it may be drilled deeper. The total production from the pool on February 28 was 7,884 bbls. from 13 wells.

New Wells in East Little River

East Little River Pool had some new wells completed during the week. Magnolia Petroleum Co.'s No. 3 Brame, SW cor. NE NE, Section 8-7-7, flowed 504 bbls. in 18 hours from sand at 3,195-3,205 feet and was drilling deeper. Prairie Oil & Gas Co.'s No. 3 Harjo, NE cor. SE NW, Section 8-7-7, was drilled to 3,195 feet where it flowed 180 bbls. of oil and 5 bbls. of water. Same operator's No. 2 Tiger, SW cor. NW NE, Section 8-7-7, was drilled to 3,192 feet and flowed 210 bbls. of oil and 10 bbls. of water in 24 hours.

In the Sasakwa district, Pure Oil Co.'s No. 10 Bates, in Section 13-6-7, flowed and swabbed 1,641 bbls. in 17 hours from the Wilcox sand at a total depth of 4,207 feet. Same operators' No. 8 Bates, SE cor. NE, Section 13-6-7, was plugging back at 2,960 feet. No. 9 Bates, in Section 13-6-7, had Wilcox sand at 4,149-52 feet, and was shut down with 800 feet of oil in the hole.

In the west extension to the St. Louis Pool, J. W. Guin's No. 1 Coley, NW cor. SE SE, Section 24-7-4, flowed 390 bbls. in nine hours from a total depth of 3,851 feet, in Hunton lime. The well is shut in for several days to complete its proration time. It is the only well of importance in the entire St. Louis Pool. Same operators have staked another location for No. 2 Coley, SW cor. SE SE, Section 24-7-4, St. Louis Pool.

The Prairie Oil & Gas Co.'s No. 1 Deathridge, NW cor., Section 28-7-4, between Pearson and the west extension of the St. Louis Pool, flowed 150 bbls. of oil and then went to water. The test was in the Simpson at 4,206-07 feet. The test was shut down with the hole standing full of water.

Oklahoma City Shipments

Pipe line and tank car shipments from the Oklahoma City Pool for the week ending February 26 were as follows:

Company—	Bbls.
Empire	223,839
Indian Territory	31,671
Magnolia	42,468
Oklahoma	111,541
Prairie	133,475
Shell	2,342
Sinclair	4,380
Tidal	500
Healdton	60,336
Total	610,552

Greater Seminole Production

Production in the important pools of the Greater Seminole area staged a comeback during the week and increased over 46,000 bbls. daily on the gauge for the week ending February 26. The Seminole area averaged 224,257 bbls. from 1,828 wells. The daily average gauges for the different pools in the area were as follows:

Pool—	Wells	Bbls.
Little River	358	41,997
East Little River	57	19,157
Carr City	59	10,380
Maud	136	5,822
Mission	110	12,798
Bowlegs	293	21,269
Earlsboro	299	33,524
East Earlsboro	126	45,756
Seminole	272	21,037
East Seminole	31	3,248
Searight	87	9,269
Allen	256	19,030
Asher	26	2,078
Konawa	13	5,591
St. Louis	470	43,649
Sasakwa	45	9,243
Total	2,638	303,848

Greater Seminole Shipments

The daily pipe line and tank car shipments for the seven days ending February 26 were 212,641 bbls., a decline from the previous week. The shipments by companies for the week were as follows:

Company—	Bbls.
Barnsdall	1,801
Champlin	5,118
Continental	1,512
Consolidated	579
Cosden	6,643
Empire	6,271
Gypsy	19,926
Magnolia	12,027
Oklahoma	33,411
Prairie	25,915
Producers & Refiners	2,321
Pure	4,148
Shaffer	5,214
Shell	16,570
Sinclair	34,032
Texas	17,474
Tidal	12,266
White Oak	722
Total	205,950
Tank cars	6,691
Grand total	212,641

Beckham County

Roy Johnson has the slush pit dug for No. 1 Brower, C NW, Section 29-10-22w.

Caddo County

Ramsey Petroleum Co.'s No. 8 Wade, NW cor. NE SW, Section 2-5-9w, is rigging up to deepen from 2,430 feet.

Carter County

Ven Mex Oil Co. has the rig up for No. 1 Miller, SW cor., Section 29-1s-3w. Magnolia Petroleum Co.'s No. 5 Anderson, NW cor., Section 23-1s-3w, has been completed for 23 bbls. in sands 2,412-2,688 feet. No. 5 E. Gill, NE cor. SE NE, Section 23-1s-3w, made 26 bbls. at 2,712 feet.

Cotton County

Shasta Oil Co. has the rig up to deepen No. 1 Tan-Nah, SW cor. NE, Section 31-1s-9w. Harris & McNeal's No. 1 Chambers, SW cor. NW, Section 1-2s-10w, is drilling at 1,800 feet.

Creek County

Central Commercial Oil Co. is erecting the rig for No. 3 Hay, SW cor. NW SW, Section 10-17-10. Chestnut & Smith's No. 1 Boling, SE cor. NW SW, Section 27-17-12, is drilling at 250 feet. J. E. Martin and others' No. 1 Bruner, C SW NW, Section 27-17-13, is spudding. F. B. Murta and others' No. 1-A Page, SW cor. SE SW NW, Section 34-16-10, is spudding. Tom Steele and others' No. 1-A Bernstein, NW cor. NE SE, Section 8-16-11, is a rig. McGraw Oil Co. has the rig up for No. 1 McIntosh, SW cor., Section 15-16-11. George Whittman and others' No. 1 Smith, NE cor. NW SW, Section 11-14-10, is rigging up. Iron Mountain Oil Co.'s No. 1 L. John, SE cor., Section 4-17-10, has been completed for 3,500,000 feet of gas in sand 1,036-52 feet. C. O. Buckles and others' No. 1 King, C SE SW, Section 18-17-10, is dry and abandoned at 2,172 feet. Curtis Oil Co. and others' No. 1 Little Head, SW cor. NW NW, Section 20-17-10, drilled to 3,049 feet, plugged back to sand 2,642-54 feet and made a 10-bbl. well. The Texas Company's No. 1 Lawson, NE cor. NW, Section 20-17-10, is dry and abandoned at 2,651 feet. Pure Oil Co.'s No. 27 Berryhill, CWL NE NE, Section 18-17-12, has been completed for 300,000 feet of gas in sand 1,651-72 feet. Curtis Oil Co. and others' No. 1 Allen, SE cor. NE NE, Section 27-16-10, is a dry hole at 3,122 feet. Shaffer Oil & Refining Co. and Billingslea's No. 1 Lewis, SE cor. SW SW, Section 10-15-8, made 235 bbls. in Wilcox sand 3,795-3,841 feet.

Grady County

Tom B. Nichols made location for No. 1 Burgis, C NE NW, Section 34-5-8w.

Lincoln County

T. B. Slick Oil Co. has the rig up for No. 1 Hamner, SE cor. NW, Section 35-16-2.

Marshall County

W. A. Neff and others' No. 1 Croweh, SW cor. NW SE, Section 11-5s-5, is a machine. Bilbo Oil Trust Co.'s No. 5-B Talifero, NW cor. NE SE SE, Section 14-5s-5, Madill Field, is drilling at 500 feet. F. W. Merrick's No. 4 Null, NW cor. SE NW, Section 24-5s-5, is drilling at 500 feet. Lee and others' No. 1 Hilburn, SE cor. NE SE, Section 22-5s-5, is dry and abandoned at 610 feet. Magnolia Petroleum Co.'s No. 1 Coatsworth, SW cor. SE SE SE, Section 30-5s-6, has been abandoned at 927 feet.

Muskogee County

C. O. Buckles moved a machine in to deepen No. 1 S. Lowery, NW cor. SW, Section 9-15-15. H. L. Jolly's No. 2 T. Carlina, NW cor. NE NW SW, Section 9-15-18, is rigging up to deepen from 1,349 feet. W. H. Hooker, Trustee's No. 1 Muskogee Townsite, Block 21, SW cor., Section 27-15-18, is rigging up. Robinson Brothers moved a machine in for No. 5 Lewis, C NW NE, Section 8-13-16. C. O. Buckles' No. 9 M. Barnett, NE cor. SE, Section 8-15-15, has been deepened to sand 1,644-72 feet and completed for 50 bbls. H. E. Williams' No. 1-A Davidson, CNL SE SW, Section 24-15-17, is dry and abandoned at 1,452 feet. Seminole Petroleum Co.'s No. 1 Murrell, NW cor. SE SE, Section 16-15-18, has been abandoned at 2,425 feet. W. J. Metzger's No. 2 S. Taylor, NW cor. SE, Section 14-14-18, is dry and abandoned at 1,460 feet.

Noble County

Indian Territory Illuminating Oil Co.'s No. 2 McCormick, NE cor. SE SW, Section 32-21-1w, is drilling at 275 feet.

Oklahoma County

W. R. Raynolds and others made location for No. 1 Jones, SW cor. NW SW, Section 1-11-3w, Oklahoma City Field. Cromwell & Franklin's No. 21 Trosper Park, NW cor., Section 13-11-3w, is a cellar. No. 22 Trosper Park, SW cor. NW NW, Section 13-11-3w, is also a cellar. Indian Territory Illuminating Oil Co. and others' No. 1 E. Trosper, NE cor., Section 14-11-3w, is a cellar. The cellar has been dug for No. 2 E. Trosper, SE cor. NE NE, Section 14-11-3w. Wirt Franklin Petroleum Corp. made location for No. 8 Lowery, SW cor. SE NE NW, Section 12-11-3w. Cromwell & Franklin dug the cellar for No. 23 Trosper Park, SE cor. NW, Section 12-11-3w. Indian Territory Illuminating Oil Co. made location for No. 3 Canfield But-

ton, NW cor. NE SW, Section 19-11-2w. Location has been made for No. 5 Button, NE cor. NW SW, Section 19-11-2w. No. 2 Farley Fuzzell, SW cor. SE NW, Section 19-11-2w, is a location. Location has been staked for No. 3 M. Fuzzell, SE cor. SW NW, Section 19-11-2w.

Wirt Franklin Petroleum Corp.'s No. 3 Lowery, SW cor. NW NW, Section 12-11-3w, has been completed for 15,029 bbls. in sand 6,403-32 feet. No. 4 Lowery, C W half E half NW, Section 12-11-3w, made 8,208 bbls. in sand 6,334-61 feet. Indian Territory Illuminating Oil Co. and others' No. 3 E. Fortson, NE cor. SE NE, Section 24-11-3w, has been completed for 22,938 bbls. at 6,521 feet in lime. No. 2 K. Henning, SW cor. SE, Section 24-11-3w, has been completed for 50,000,000 feet of gas in lime 6,420 feet. No. 1 Jones, NW cor., Section 31-11-3w, flowed 6,241 bbls. from sand 6,483-6,519 feet. Indian Territory Illuminating Oil Co. and others' No. 1 Farley-Fuzzell, SE cor. NW, Section 19-11-2w, topped lime at 6,005 feet, drilled to 6,501 feet and made 29,999 bbls. The Prairie Oil & Gas Co. and T. B. Slick's No. 7 Hiddleston, NE cor. SW SE, Section 19-11-2w, has been completed for 5,685 bbls. in lime 6,075-6,485 feet. Sinclair Oil & Gas Co. and Amerada Petroleum Corp.'s No. 1 Kinter, NW cor. SE, Section 30-11-2w, has been completed for 1,005 bbls. in Arbuckle lime 6,343-51 feet.

Osage County

Cities Service Gas Co. has the rig up for No. 93 NE cor. SW SW SW, Section 17-25-8. Peters Petroleum Corp. and others' No. 1, SW cor. SE, Section 22-25-9, is a rig moving in. Cities Service Gas Co.'s No. 92, C NW NW, Section 15-26-9, is rigging up. Peters Petroleum Corp. and Producers & Refiners Corp.'s No. 9, NW cor. NE SE SE, Section 22-27-11, has been completed for 50 bbls. in Bartlesville sand 1,692-1,714 feet.

Okfuskee County

Sunray Oil Co. and Shelden's No. 1 Wilson, NW cor. SW, Section 22-12-11, is cleaning out to deepen from 2,724 feet. Independent Oil & Gas Co.'s No. 2 Wilson, SE cor. SW NW, Section 22-12-11, has been completed for 25 bbls. in sand at 3,500 feet after plugging back from 3,506 feet. Champlin Oil & Refining Co.'s No. 15 Jacobs, NW cor. SE SE, Section 15-11-11, made 15 bbls. in sand 2,514-20 feet. R. L. Walker and others' No. 1-A Tarvin, CEL SE NW, Section 3-11-11, has been abandoned at 2,311 feet.

Okmulgee County

The Carter Oil Co. and others' No. 2 Chamberlain, NE cor. NW NE, Section 3-14-12, made 10,000,000 feet of gas in sand 1,830-1,945 feet. T. W. McCurry's No. 1-A Stake, SW cor. NE NW, Section 19-13-15, is dry and abandoned at 1,328 feet.

Pawnee County

The Prairie Oil & Gas Co.'s No. 1 Cotton, SW cor. SE NW, Section 6-20-8, is drilling deeper at 2,567 feet. Cimarron Oil Co.'s No. 2 Smelzer, NW cor., Section 29-20-9, is rigging up. Martin and others' No. 5 Cotton, CSL NE SW, Section 6-20-8, has been deepened to Tucker sand 2,611-33 feet and completed for 180 bbls. Devonian Oil Co.'s No. 3 Copeland, CSL SE SW, Section 26-20-9, is dry and abandoned at 3,113 feet.

Payne County

Shaffer Oil & Refining Co. and F. Billingslea's No. 1 Miller, NE cor., Section 20-19-5, has been completed for 130 bbls. at 3,863 feet after plugging back from 3,866 feet. Shaffer Oil & Refining Co.'s No. 4 Little Chief, SE cor. NW NE, Section 4-18-5, has been completed for 400 bbls. in Wilcox sand 3,462-97 feet.

Pittsburg County

Central States Light & Power Co.'s No. 1 Carney, SE cor. NE, Section 9-7-18, is drilling at 1,350 feet.

Pontotoc County

Denver Producing & Refining Co.'s No. 2 Roberts, NE cor. SE NE, Section 36-5-4, has been completed for 45 bbls. in sand 2,614-35 feet. Skelly Oil Co. and Mid-Kansas Oil Co.'s No. 1 Buykin, SE cor. SW SE, Section 14-5-7, is dry and abandoned at 4,386 feet.

Pottawatomie County

Pure Oil Co. and others made location for No. 1 Caulding, NE cor. SE NW, Section 19-9-5. Continental Oil Co. and others' No. 1 Bradenburg, SE cor., Section 34-8-4, flowed 405 bbls. at 3,760 feet after plugging back from 3,984 feet. Amerada Petroleum Corp.'s No. 2 Smith, SW cor. NE NE, Section 8-8-5, Mission Pool, made 300 bbls. from Hunton lime 4,028-49 feet. Independent Oil & Gas Co. and Mid-Kansas Oil & Gas Co.'s No. 3 Weldfelt, NE cor. SW NW, Section 2-7-4, flowed 260 bbls. from Hunton lime 3,668-3,825 feet. Gypsy Oil Co.'s No. 1 Duvall, NW cor. SW, Section 3-7-4, made 530 bbls. from Hunton lime 3,823-3,959 feet. Atlantic Oil Producing Co. and others' No. 1 McGee, NE cor. NW SE, Section 4-7-4, flowed 2,265 bbls. from Hunton lime 3,750-4,010 feet. Magnolia Petroleum Co.'s No. 1 Tartar, SW cor. NW SW, Section 15-7-4, drilled to 4,233 feet, plugged back 3 feet and made 233 bbls.

Seminole County

Dixie Oil Co. has the rig on the ground for No. 1 M. Lena, SE cor., Section 15-9-5, Earlsboro Field. No. 2 M. Lena, SW cor. SE SE, Section 15-9-5, is a location. Amerada Petroleum Corp. and Dixie Oil Co. made location for No. 3 Edwards, NW cor. NE NE, Section 22-9-5, South Earlsboro Extension. Amerada Petroleum Corp. and others staked location for No. 3 Ground, NE cor. NW NW, Section 23-9-5. Mid-Continent Petroleum Corp. made location for No. 1 L. Ground, NW cor. NE NE, Section 23-9-5. Burke-Greis Oil Co. is building the rig for No. 1 S. Powell, SW cor. NE SE, Section 7-9-6, East Earlsboro Pool. M. H. Watt and others made location for No. 1 Gilbray, SE cor. NE, Section 4-8-8. Magnolia Petroleum Co. staked location for No. 2-A Scipio, SW cor. NW NW, Section 4-7-7. No. 2 Wisey, NW cor. NE SW, Section 9-6-6, Konawa Pool, is a location. Location has been made for No. 1 S. Palmer, NW cor. NE SE, Section 31-6-8. No. 1 Sakteka, NW cor. SW NE, Section 31-6-8, is also a location. Location has been made for No. 1 W. Palmer, NE cor. SE SW, Section 31-6-8. The Texas Company has the rig up for No. 3 Lewis, NW cor. SE NW, Section 13-5-7.

Amerada Petroleum Corp. and others' No. 1 Edwards, SE cor. NE NE, Section 22-9-5, South Earlsboro Pool, has been completed for 8,170 bbls. in Wilcox sand 4,188-4,214 feet. Carter Oil Co.'s No. 2 Chowning, NW cor. SW SW, Section 19-9-6, flowed 3,910 bbls. from Wilcox sand 4,168-84 feet. No. 2 Campbell, SW cor. NW SW, Section 20-9-6, East Earlsboro Pool, flowed 1,970 bbls. from Wilcox sand 4,190-4,210 feet. Magnolia Petroleum Co.'s No. 1 Coker, SW cor. SE, Section 13-7-6, Little River Pool, had Wilcox sand 4,171-86 feet and swabbed 430 bbls. Reiter-Foster Oil Corp.'s No. 4-A Bunyard, NE cor. NW SW, Section 14-7-6, is dry and abandoned at 3,382 feet. Gypsy Oil Co.'s No. 1 Barhan, NE cor. SE, Section 8-6-6, Konawa Pool, made 340 bbls. in Cromwell sand 2,852-62 feet. E. L. Harris and others' No. 4 Harjoche, SW cor. SE SE, Section 8-6-6, has been completed for 1,377 bbls. in sand 2,880-2,932 feet. McCulloch Oil Co. and Carter Oil Co.'s No. 1 Culley, NW cor. NE SW, Section 16-6-6, has been completed for 721 bbls. in Cromwell sand 2,922-32 feet. Magnolia Petroleum Co.'s No. 4 Reed, NE cor. SW, Section 13-5-7, made 15,000,000 feet of gas in sand 2,782-89 feet. The Prairie Oil & Gas Co.'s No. 1 Griffin, NE cor., Section 17-6-6, Konawa Pool, made 1,430 bbls. in Cromwell sand 2,907-47 feet.

Stephens County

Crane & Rankin's No. 1 Brown, NW cor. NE, Section 23-1-9w, is rigging up to deepen from 2,178 feet. Amerada Petroleum Corp. has the rig up for No. 8 Hansen, SE cor. SW SW, Section 12-1s-4w. Shasta Oil Co.'s rig is up for No. 2 Patterson, SW cor. NW NW NW, Section 1-2s-10w. George Pace and others' No. 1 Wilson, NW cor. SW NW NE, Section 20-2s-7w, is coring at 1,111 feet. Wirt Franklin Petroleum Corp. is building the rig for No. 3 Spain, SE cor. SW NW, Section 9-2s-6w. Atlantic Oil Producing Co.'s No. 4 Taylor, SE cor. SW NW, Section 12-1s-4w, has been completed for 200 bbls. at 3,814 feet.

Tillman County

Bridewell Oil Co.'s No. 1 Rutherford, NE cor. SE, Section 11-4s-16w, is rigging up.

Tulsa County

H. C. Dean and others' No. 1 Grayson, SW cor. SE SW, Section 20-19-14, is a machine rigging up. Murray and others' No. 1 Bruner, SE cor. NE, Section 20-19-14, is drilling at 700 feet. R. E. Downing's No. 1 Marshall, SE cor. NE NE, Section 35-19-14, is drilling at 440 feet. L. E. Lockhart's No. 1 Brown, SE cor. SW, Section 5-16-14, is spudding. L. L. Boyd's No. 1-A Horn, SE cor. NW, Section 23-18-14, made 5 bbls. in sand 1,550-62 feet. Little Ed Oil Co.'s No. 3 McKim, NE cor. SE, Section 30-17-14, is dry and abandoned at 1,435 feet. Scott & Christie's No. 1 Billy, SW cor. SE NE, Section 32-17-14, has been abandoned at 1,496 feet. Gilbertson and others' No. 1-A Fields, SE cor. NW SE, Section 21-16-14, is a dry hole at 2,045 feet.

Wagoner County

W. H. Bauder's No. 1-A Scherley, SE cor. NE, Section 7-18-15, is dry and abandoned at 1,310 feet. Union Oil Co.'s No. 1-A M. McKellop, NW cor. NE NW, Section 25-18-15, has been abandoned at 1,135 feet.

Woodward County

Harris & Haun's No. 1 Wyatt, C SE. Section 9-23-20w, is dry and abandoned at 5,660 feet.

Daily average production of the Seminole area for the week ending February 24:

Little River Pool

Company, farm—	S.T.R.	Wells	Prod.
Amerada:			
Billington	24-7-6	1	30
Nitey	2-7-6	3	196
Amerada-Wilcox:			
Fore	35-8-6	2	419
Barnsdall:			
Cotcha	23-7-6	3	482
Factor	13-7-6	1	65
Hotulka	22-7-6	3	143
Walker	4-7-6	1	8
Blackwell:			
Baker	11-7-6	5	284
Nitey	35-8-6	5	180
Talley	14-7-6	4	522
Thomas	11-7-6	1	Off
Bryan-Emery:			
Carter	4-7-6	1	20
Carter:			
Alec	23-7-6	2	6
Cotcha	23-7-6	3	52
Cudjo	23-7-6	3	130
Factor	26-7-6	1	23
Fish	36-8-6	3	180
Harjo, C.	11-7-6	2	1,106
Harjo, M	13-7-6	4	157
Jackson	11-7-6	5	1,696
Larney, B.	26-7-6	2	189
Larney, J.	24-7-6	4	633
Lena	10-7-6	1	251
Moore	11-7-6	2	89
Tewee	14-7-6	6	476
Thomas, M.	11-7-6	1	166
Walker	24-7-6	4	2,416
Wilson	12-7-6	1	79
Champlin:			
Tewee	14-7-6	3	648
Continental:			
Cosar, L.	36-8-6	7	500
Cosar, M.	25-8-6	1	189
Milsey	11-7-6	2	220
Empire:			
Charty	24-7-6	3	330
Coker	13-7-6	4	1,430
Sandlin	3-7-6	1	10
Gypsy:			
Brown, C.	33-8-6	1	206
Brown, M.	33-8-6	1	82
Campbell	36-8-6	1	5
Conard	22-7-6	2	76
Cosar, W.	36-8-6	2	110
Cotcha	23-7-6	13	844
Denmark	11-7-6	3	437
Hulhoke	14-7-6	11	996
Nungee	1-7-6	1	Off
Pot.y	36-8-6	4	236
Renton	11-7-6	5	1,124
Willie	24-7-6	2	2,792
Independent:			
Carpenter	27-7-6	2	232
Davis, R.	13-7-6	7	914
Tewee	14-7-6	6	991
Harris	23-7-6	13	1,179
Williams	15-7-6	1	302
Independent et al:			
Davis, L.	2-7-6	5	563
Reed	26-7-6	1	Off
I. T. I. O.:			
Campbell	1-7-6	1	63
Dungan	35-8-6	3	51
House, M. A.	1-7-6	1	16
House, W. E.	1-7-6	1	3
House, W. E. "B"	2-7-6	4	449
Hull	26-8-6	2	51
Jackson	1-7-6	3	168
McCulla	1-7-6	2	353
Nitey	2-7-6	5	31
Phoebe "A"	36-8-6	1	15
Phoebe "B"	36-8-6	2	189
Soketeche	1-7-6	3	328
Magnolia:			
Cruse	2-7-6	4	432
Denby	11-7-6	4	120
Harjo "A"	14-7-6	2	45
Harjo "B"	14-7-6	2	150
Potty	35-8-6	4	56
Reed	22-7-6	3	359
Mid-Continent:			
Bruner	11-7-6	4	92
Eleck	23-7-6	1	12
Wadsworth	36-8-6	4	35
Pine:			
Bean	13-7-6	2	511
Heyecka	26-8-6	7	45
Pine-Phillips:			
Potty	35-8-6	1	35
Prairie:			
Chilcoat	25-8-6	3	282
Coker	1-7-6	2	248
Gibson	14-7-6	5	433
Harris	14-7-6	4	296
House	2-7-6	4	66
Reed	13-7-6	2	381
Talley	14-7-6	6	318
Williams	15-7-6	2	55
Wood	26-7-6	3	75
Prairie-Amerada:			
Sunny	14-7-6	5	673
Prairie-Slick:			
Cudjo	26-7-6	4	227
Producers & Refiners:			
Davis	13-7-6	1	513
Johnson	24-7-6	2	481
Moppin	24-7-6	2	78
Pure:			
Brinson	24-7-6	3	232
Cotcha	23-7-6	12	1,945
Harjo	11-7-6	5	1,220
Hollins	11-7-6	1	268
Reiter-Foster:			
Bunyard	14-7-6	2	441
Ritter	31-7-6	1	7
Shaffer:			
McCan	33-7-6	1	41
Shell:			
Ceaser	11-7-6	2	677
Glass	26-7-6	1	4
Hotulka	23-7-6	5	649
Johnson	13-7-6	4	450
Sinclair:			
Blanton	11-7-6	1	245
Cosar	36-8-6	3	525
Haney	12-7-6	1	Off
Tewee	14-7-6	3	596
Pompey	24-7-6	1	75
Skelly:			
Carl	14-7-6	2	667
Snowden-McSweeny:			
Tiger	13-7-6	2	5
Superior:			
Pulutka	31-8-6	1	3
Texas:			
Brooks	25-8-6	1	7
Coker	1-7-6	3	114
Janey	11-7-6	6	759
Texas-Independent:			
Hotulka, D.	23-7-6	7	771
Hotulka, H.	22-7-6	2	94
Tidal:			
House	1-7-6	1	40
Johnson	1-7-6	1	Off
Twin State:			
Lowe	25-8-6	1	22
Total		358	41,997

East Little River Pool

Amerada:			
Chilcoat	4-7-7	1	266
Continental et al:			
Harrison	4-7-7	5	1,007
Gypsy:			
Payne	5-7-7	6	1,609
Walker	5-7-7	3	852
Magnolia:			
Brame	8-7-7	2	1,232
Reed, E. M.	31-8-7	1	28
Scipio	4-7-7	1	3
Wolf	20-8-7	1	32
McCulloch et al:			
Harrison	4-7-7	1	1
Mid-Continent:			
Smith	5-7-7	13	4,400
Yarhola	9-7-7	3	1,092
Prairie:			
Smith	5-7-7	3	2,203
Prairie-Slick:			
Carr	9-7-7	1	24
Harjo, K.	8-7-7	1	Off
Tiger	8-7-7	2	49
Producers & Refiners:			
Lusty	5-7-7	1	9
Saketke	9-7-7	1	5
Thomas	5-7-7	2	544
Sinclair:			
Phillips	5-7-7	8	4,660
Texas:			
Chilcoat	4-7-7	2	1,141
Total		57	19,157

Carr City Pool

Barnsdall:			
Coker	11-8-5	9	875
Fife	14-8-5	2	76
Barnsdall et al:			
Tulley	10-8-5	1	79
Carter:			
Coker	2-8-5	4	2,724
Rogers	2-8-5	4	2,155
Empire:			
Cluck	11-8-5	13	1,593
Gypsy:			
Coker, Chippy	2-8-5	1	1,170
Fife	14-8-5	1	12
I. T. I. O.:			
Tulley	10-8-5	1	2
Magnolia:			
Fee	11-8-5	3	211
Killings	14-8-5	1	5
Prairie:			
Billington	11-8-5	10	776
Mitchell	15-8-5	1	76
Sinclair:			
Bean	11-8-5	5	389
Harjo, L.	11-8-5	4	237
Total		59	10,380

Maud Pool

Amerada:			
Ballard	1-8-4	1	44
Fehlig	7-8-5	1	30

(Continued on Page 228)

Arkansas River Valley Possibilities

State Geologist Outlines Facts Pertaining to Section Which Is Attracting Attention of Oil Companies

The following is a brief statement of opinion relative to the oil and gas possibilities of the portion of the Arkansas River Valley province of western Arkansas lying between the north line of Township 2n, and the north line of Township 13n.

The area makes up a part of a regional trough bounded on the south by the Ouachita Mountain uplifted region and on the north by the Ozark uplifted region. Sedimentary rocks cover the entire area.

The oldest rocks in Arkansas north of this trough are of Ordovician age. The oldest to the south are pre-Ordovician. The rocks lying within the trough itself consist of a series of younger rock systems which, in age, extend from the pre-Ordovician to the Coal Measure of Pennsylvanian age. The pre-Pennsylvanian formations which are exposed in the Ozark Plateaus and the Ouachita Mountain area respectively have never been correlated in any detail and their sections are characteristically different. Type sections of these systems are shown as the Arkansas Valley and Ozark region geologic sections on the map referred to above.

Oil and Gas Possibilities

The question of the oil and gas possibilities of this sedimentary rock area, I believe, resolves itself very largely into a question of the relative alteration for the geologic section in different portions of the area. In the southern portion, which is nearest the Ouachita uplift, the rocks have been subjected to intense folding and faulting, their alteration is relatively extreme and consequently it is to be expected that any gas which may have been generated in the formations there would probably have escaped. Any oil which may have been formed would in all probability have been volatilized. It is to be noted also that the Ouachita uplift where the upturned edges of the beds are exposed, from the Ordovician to the lower Pennsylvanian, no oil or gas seeps have been reported and no gas or fluid oil has been found in any quantity in test wells.

Northward, however, from the Ouachita uplift to the central and nothern portions of the Arkansas River Valley province, whether in the western, central or eastern part, the folds become progressively less intense, and the porosity of the sandstones as a general thing increases.

The farthest south that commercial gas production has been developed in the Arkansas River Valley is in the Mansfield Field in southern Sebastian and northwestern Scott Counties. This field obtains its production from Atoka beds. Near the center of the structure the dips range from 4 to 10 degrees and in the outer portion they are as high as 20 and 30 degrees. In addition to supplying the gas found in the Mansfield Field, the Atoka formation has yielded large quantities of gas in the Massard Prairie, Kibler, Williams, Alma, and Clarksville Fields. A recent Atoka well, Arkansas-Louisiana Pipe Line Co.'s No. 1 McFadden, in Section 15, Township 9n, Range 21w, was gauged at 34,000,000 feet.

Map Shows Limits

In the attached map I have shown very generally my idea of the northern limit of the area the rocks of which have been markedly effected by the Ouachita uplift. It is apparent that no definite line of demarkation can be drawn on account of the slow gradation from areas of greater to those of lesser rock alteration. Between this area of transition and the Ordovician area of northern Arkansas outlined above the structures become progressively less steep. In northern White, Cleburne, Van Buren, Pope, and Johnson Counties, anticlinal dips from 2 to 3 degrees are common. Northward from the central portion of the Valley province, however, the Pennsylvanian beds become progressively thinner and the Atoka section comes to an end along a line approximately that shown on the attached map, so that no gas production from the Atoka formation is to be expected north of or near to this boundary.

It is significant that along the southern flank of the Ozarks where the Pennsylvanian, Mississippian, Devonian, Silurian, and Ordovician beds outcrop, oil seeps are not uncommon, having been found in the Hale formation (Pennsylvanian), the Fayetteville shale (Mississippian), and the Chattanooga shale (Mississippian-Devonian). In the few wells drilled in the north Arkansas Valley area referred to, oil shows and small gas production have been commonly reported.

It has been claimed that the fixed carbon percentages of the coals in the Arkansas River Valley province of western Arkansas indicate that the commercial accumulation of oil there is impossible. The carbon ratio theory holds in effect that commercial accumulations of oil are not to be expected from beds associated with coals which contain a percentage of fixed carbon in excess of 70 per cent. This theory appears to apply fairly well to the Atoka formation because coals in the central portion of the valley from the west to the east usually vary from about 79 to 90 per cent fixed carbon, and wells drilled in various parts of the Atoka formation have nowhere given encouraging results so far as oil is concerned. In the northern part of the Valley province, however, the carbon ratios decrease toward the Atoka escarpment. Along that escarpment the carbon ratios in the north and northwest average around 71 per cent. One sample collected in Section 9-12n-11w, shows a carbon ratio of 60.60. Thirteen samples collected from near and north of the Atoka escarpment principally in northwestern Arkansas in the Bloyd shale of the Morrow group, have an average carbon ratio of 71.51 per cent. So far as I know, no coals have been obtained from the beds below the Morrow group in northern Arkansas and consequently until such coals are obtained, the relative alteration of the Fayetteville shale, the Moorefield shale, and the Chattanooga shale, cannot be estimated by fixed carbon percentages in this area.

The fact that fluid petroleum has actually been found in limestone concretions in the base of the Fayetteville shale, and that saturated sands have been found in the Wedington sandstone member of the Fayetteville shale, definitely indicate that the rock alteration is not too great to permit fluid hydrocarbons, and without positive evidence to the contrary it does not seem unreasonable to suppose that the alteration may be sufficiently low to permit the accumulation of oil in commercial (although probably not very large) quantities.

Gas Possibilities

For the reasons stated, I believe that drilling in undeveloped areas under favorable structural conditions in the northern portion of the Arkansas River Valley within the area shown on the attached map carries with it reasonable possibilities for the discovery of commercial quantities of gas. The commercial gas possibilities, it appears, are much more favorable in the Atoka formation than in the underlying beds, because very nearly all of the gas found up to this time in western Arkansas has been obtained from this formation. However, some deeper gas production appears reasonably possible, especially from the Chattanooga shale and associated porous beds.

Testing for oil in this area is a speculative venture on account of lack of detailed information both as to the relative alteration of the concealed lower Pennsylvanian, Mississippian, and older beds, and as to the stratigraphy and structure of these rocks in the northern portion of the area. I believe, however, that it is an area which is quite worthy of testing for oil by organizations well able to pay the costs of speculative prospecting. Apparently the greatest possibilities for the occurrence of oil lie between the base of the Atoka formation and the upper portion of the St. Peter sandstone.

The above interpretation of the oil and gas geology of western Arkansas is partly based upon data contained in a report recently completed by Carey Croneis who has made an extensive survey of the oil and gas possibilities of the Arkansas River Valley province of western Arkansas for the Arkansas Geological Survey. His report is soon to be published under the name of "The Geology of the Arkansas Paleozoic Area. With Especial Reference to the Oil and Gas Possibilities."

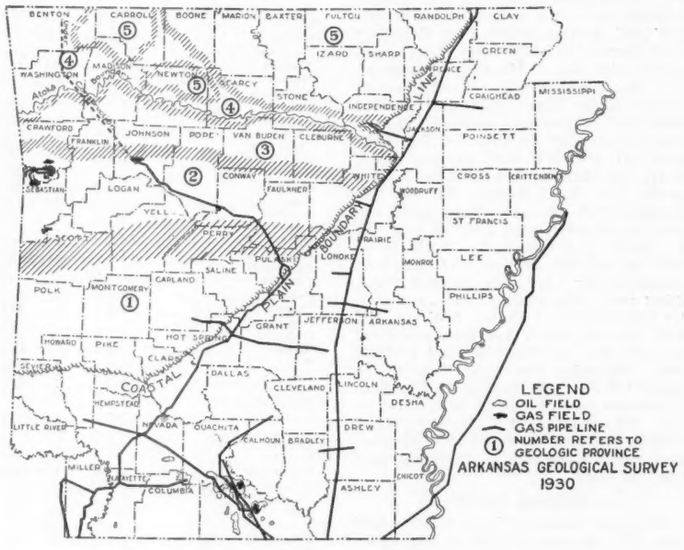
MUCH INTEREST IN AREA COVERED

The accompanying article was prepared by Doctor Branner at the request of the Department of Conservation and Inspection of the State of Arkansas. That department states of the article:

"In view of the manifest interest by extensive leasing, blocking and the actual drilling now of wells by responsible people, together with making other locations for drilling test wells for oil and gas in the territory referred to as the Arkansas River Valley region in this State; connected with the fact that your Journal as well as other publications has seen fit to publish statements and data relative to the geology of this region, and fully appreciating the ability and standing of Dr. George C. Branner, state geologist, this department of state respectfully prevailed upon him to give a report or statement reflecting his conclusions as to the possibilities of oil and gas in this area.

"The statement of Doctor Branner, we believe to be one of the most thorough and compact that could be made relative to the subject.

"Since receiving this statement, and because of the wide and extensive interest in this territory at this time, we approached Doctor Branner asking his permission that it appear in some publication worthy of the article and which would be appreciative of the motives incident thereto. Therefore, we are privileged to hand to you first this statement for your consideration for publication in The Oil and Gas Journal as an article of interest to its subscribers and readers."



Area 1—Area strongly affected by the Ouachita Mountain uplift. Unfavorable for the commercial production of oil or gas.

Area 2—Area much less affected by the Ouachita Mountain uplift than Area 1. Commercial gas production probable with good structure. Commercial oil production to a small degree favorable with good structure but drilling would have to be deep. Area is less favorable for commercial oil production than Area 3.

Area 3—Area of exposed Pennsylvanian beds least affected by the Ouachita Mountain uplift. Commercial gas production probable with good structure. Commercial oil production somewhat more favorable than Area 2.

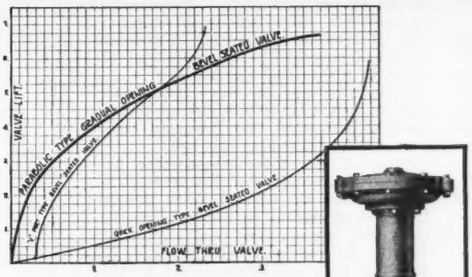
Area 4—Springfield Plateau and extreme northern portion of area of exposed Pennsylvanian beds. Favorable for small gas production. Commercial oil production not probable.

Area 5—Principally Salem Plateau area of exposed Ordovician dolomites. Unfavorable for the commercial production of oil or gas.

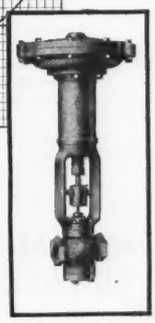
PRAIRIE P. L. SHIPMENTS

The Prairie Pipe Line Co.'s shipments of crude oil in February were 5,433,144.10 bbls., a daily average of 194,041 bbls. In January the company delivered 6,257,643.92 bbls., a daily average of 201,859 bbls., and in December, 6,410,734 bbls., an average of 206,798 bbls. per day.

Control Flow Exactly ---- with NEILAN *parabolic* VALVES



Flow curve of Neilan Parabolic Gradual Opening Valve.



Neilan Ball Bearing Diaphragm-Motor Valve in which Parabolic gradual opening feature is extensively used.

PRECISELY controlled flow—so vitally essential to the smooth operation of a gasoline plant or refinery—is easily accomplished with the Neilan Parabolic Gradual Opening Valve.

This engineering triumph is a product of the Neilan Laboratory — the answer to plant engineers' demands for a gradual opening valve whose flow curve is a parabola—universally recognized as the perfect flow curve.

Graduated port openings in the Neilan Parabolic Valve assure accurate flow control under the most severe and difficult conditions. The improved valve guides on the seat rings provide greater capacity by eliminating turbulence in the flow.

Parabolic Valves are widely used in diaphragm-motor valves for temperature and flow controllers, in lever valves and other control valves requiring widely varying volume control.

Many other improvements and special features of these valves are interestingly described in the Neilan Parabolic Gradual Opening Valve bulletin. Write for a copy today.

Los Angeles, March 16-23, 1930
BOOTH 100

NEILAN, SCHUMACHER & CO.

641-651 Santa Fe Ave., Los Angeles, California

Branch Offices

New York—30 Church St. ---------- Rudolph B. Werey, Mgr.
Chicago—55 E. Wacker Drive --------- John M. Coffeen, Mgr.
Dallas—Sanger Hotel ---------- Roy O. Campbell, Mgr.
Maracaibo, Venezuela—Apartado 298--Patrick H. Heeney, Mgr.

Representatives

Stocks carried

Tulsa—221 E. Archer St. ---------- Camp-Morgan Co.
Houston—1400 Conti St. ------ Maintenance Engineering Corp.

"YOU CAN BE SURE OF NEILAN PRODUCTS"

Natural Gas Developments

COKE GAS EXPANSION IN NATURAL GAS AREA

NEW YORK, Mar. 1.—The acquisition of a share in the United States Electric Power Corp. by the Koppers Co. of Delaware was viewed in Wall Street as an indirect consequence of the position taken by the United States Electric group in the Standard Power & Light Co. Some of the latter system's principal properties are owned by the subsidiary Philadelphia company, which provides electric, gas and traction service to Pittsburgh and adjacent territory. The new relationship may conceivably be followed by an extension of the gas industry in the territory through co-operation of the Standard and Kopper groups.

With regard to other sections of the United States served by the Standard or Koppers group, the financial district, the New York Times says, is inclined to expect an increase in the prospects of coke oven gas production either against or in co-operation with natural gas, which is used extensively in several parts of Standard territory, including Pittsburgh and Louisville. In competition between artificial and natural gas, the decision often turns on the relative costs of the two products, that of coke gas devolving on prices of coal less the proceeds from the sale of the by-products from gas production.

While consumption of natural gas is increasing faster than that of manufactured gas in many sections of the country, coke oven gas production is gaining briskly in contrast to the decline in other forms of manufactured gas. The Koppers Co. has been actively building up a chain of by-products coke gas properties along the Eastern Seaboard, supplied by affiliated barge companies with coal from affiliated mines, with other affiliated companies selling the chemical and coke by-products of gas production.

Boston, New Haven, Brooklyn, Jersey City and Philadelphia are the principal centers of this development. The Koppers and Standard groups have a common meeting ground at St. Paul, Minn., and further contacts are expected to result.

HELIUM PLANT RESUMES

The helium gas plant in southeastern Cowley County, Kansas, is running to capacity again, operating on gas being supplied by the Trees Oil Co., which discovered a new helium area 5 miles south of Dexter. No additional wells are being drilled since the present supply of gas is sufficient to fill the needs of the plant. When the Trees company opened the new source of helium gas, the Kentucky Oxygen & Nitrogen Co. had taken the first steps to move its plant from Dexter.

HAMILTON GAS DIRECTORS

At the annual meeting of the stockholders of the Hamilton Gas Co. the following directors were elected: W. Angamar Larner, Arthur Peck, Philadelphia; Douglas Thomas, Baltimore; Chester W. Larner, Philadelphia, Eugene L. Norton, New York; Charles M. Snaith, Weston, W. Va.; Louis A. Johnson, Charleston, W. Va.; Philip V. R. Van Wyck, New York; Hugh Peters, New York; Wallace T. Perkins, New York.

NEW RATES DEFEATED

CHATHAM, Ontario, Mar. 1.—Ratepayers of the municipalities of Port Colborne and Humberstone have defeated by-laws to grant higher rates to the Dominion Natural Gas Co.

HELIUM CO. DECLARES GOVERNMENT COMPETITION UNFAIR AND COSTLY

By Charles E. Kern
Washington Bureau, The Oil and Gas Journal

WASHINGTON, D. C., Mar. 1.—While the House Subcommittee on the Naval Appropriation Bill is having a hearing on the request of the Navy Department for an appropriation sufficient to purchase 9,000,000 feet of helium gas to be used in lighter-than-air ships of the Navy during the fiscal year ending June 30, 1931, James T. Howington, vice president of the Helium Co. of Louisville, Ky., has addressed a communication to the committee disputing the figures of the Bureau of Mines relative to the cost to the Government of buying helium at its Amarillo plant and from the Helium Co.

The Bureau of Mines has previously stated that the failure of the Navy Department to order more than 5,000,000 feet of helium for use during the current fiscal year would make it necessary to expend $9,500 a month for all but two of the remaining months of this fiscal year merely to keep its plant in Amarillo, Tex., in a condition of readiness for operation as needed.

It is stated that the appropriation for helium for the Navy Department for the fiscal year was based on an estimate of 8,000,000 feet and it is declared by the Bureau of Mines that if the Navy had ordered that amount of helium from the Amarillo plant that plant would have been kept in continuous operation up to July 1. The interference with this plan, according to Scott Turner, director of the Bureau of Mines, was caused by the Navy purchasing 3,000,000 feet of helium gas at about $35 per thousand feet from the private Helium Co. of Louisville, Ky. If this additional amount had been purchased from the Amarillo plant, Mr. Turner has stated, the 3,000,000 feet would have been obtained for about $3 per thousand feet.

Denies Company Received Order

Vice President Howington of the Helium Co. in his statement not only denies the placing of an order by the Navy Department with his company for 3,000,000 feet of helium but disputes the Government's cost figures. He analyzes the cost estimates of the Bureau of Mines to show that numerous important items of expense have been omitted and makes a striking comparison of government and private enterprise in business, indicating that the manufacture of helium gas is in line with other proposals for the Government entering business in competition with private enterprises.

The result of questions raised in this effort to have the Government indefinitely continue in and monopolize the helium extraction business is a determination on the part of the subcommittee to conduct a comprehensive investigation into all phases of that subject. The result of the inquiry will be of widespread interest to the natural gas industry.

In denying that the Navy Department had purchased 3,000,000 feet of helium from his company, Vice President Howington in his statement says:

"Instead, the Navy Department has rejected the recent bid of the Helium Co. and has also suspended further production and shipments on an existing contract that has not been completed. This decision by the Navy Department resulted in the closing down of the Helium Co.'s plants in Kansas and Colorado be-

(Continued on Page 260)

TAX ON NATURAL GAS IS ARGUED BEFORE THE TEXAS LEGISLATURE

AUSTIN, Tex., Mar. 1.—It is believed that neither of the two natural gas tax bills before the legislature will be enacted and likely will not even receive consideration on the floor of the house. Representative Mauritz of Ganado has announced his own measure would play too much havoc with producers, while Representative Sanders of Nacogdoches said he will not press his still higher tax when producers submit data showing they would be adversely affected.

Owners of wells were here in force conferring with legislators and are convinced that neither bill stands any chance of passage.

Mauritz's bill imposed a tax on gas, 1-cent per 1,000 feet, graduate tax from one-fourth cent to 2 cents, but the latter rate would apply to nearly all production.

J. G. Strong of Carthage, Panola County judge and a former State senator, represented his county in opposition to the bills. He said he had no connection with any producers or distributing companies. The county, he said, has a small gas field which yields an ad valorem valuation of about $1,000,000.

"If the tax bill passes," he declared, "it would mean that producers in our county would stop operations and this would eliminate at least half the taxable values of the gas properties and the result would be to bring valuation below a point necessary to raise a certain amount to pay outstanding bonds and county debts. There are 120 other counties of Texas in a similar condition, and if any of them is depending on gas properties they may experience results similar to those that would exist in our county."

A statement prepared for the legislature by the oil and gas division of the railroad commission estimates the annual production of high pressure and casinghead gas in the State at 789,000,000,000 feet. A tax of 1 cent per 1,000 feet would yield $7,890,000, according to these figures. A tax of 1 per cent of gross sales at prevailing prices would produce $268,260.

Argument for Tax

Representative Sanders in support of his tax bill said:

"For 1928, Texas was the second largest producer of natural gas in the United States, with 301,990,000,000 feet. The estimated average value at the well was 3.4 cents per 1,000 feet, amounting to $10,267,660.

"There was consumed in Texas during 1928 for industrial purposes 201,434,000,000 feet and for domestic purposes 27,284,000,000 feet. The consumption exceeded the production by 16,728,000,000 feet. The gas used for domestic purposes with an average value at the point of consumption of 67.1 cents per 1,000 feet, had a total value of $18,307,564. It is readily seen that the gas used for domestic purposes, 27,284,000,000 feet, is less than one-tenth of the production, amounting to 301,990,000,000

(Continued on Page 257)

OVERPRODUCTION HITS CARBON BLACK PRICE

Repeated price cuts have drawn considerable attention to carbon black. Carbon black maintained firm prices until November. During the first 10 months of 1929 the Texas price had been 8 cents and the Louisiana one 8.1 cents at the works. The final two months saw a rapid decline until by the end of the year these quotations had been cut to 6 and 6.1 cents. This bearish trend has been maintained during January and February, two slashes of one-half cent each bringing prices down to 5 and 5.1 cents.

Competitive selling has assumed the appearance of a price war. This has followed a decided falling off of the demand, especially from the tire industry. In December of last year the production of casing, inner tubes and solids and cushions amounted to 7,015,186, against 10,831,128, a decline of over 3,800,000. For the year the total of tires and inner tubes turned out fell off over 4,000,000.

With the decline of business independent producers began to undersell the market. Producers had turned out huge surplus quantities of carbon black because of the belief that extensive piping of the Monroe gas field would deprive them of their supply of cheap gas in a short time. This piping did not develop as quickly as anticipated, with the result that huge stocks have been piled up while an adequate supply of gas was still to be had. Consumption during the past four months has ranged from 50 to 60 per cent of normal. The effort to unload this huge inventory has had its natural results. Tire manufacturers have been more liberal in recent purchases.

COLUMBIA GAS & ELECTRIC

Columbia Gas & Electric Corp., which serves a population of over 5,000,000 in 1,066 communities in Pennsylvania, Ohio, Kentucky, Maryland, Indiana, West Virginia and New York, made public its completed annual report for the year ended December 31, 1929. The year 1929 concluded a three-year period since the merger of the Columbia and Ohio Fuel systems on November 1, 1926, and some of the benefits of this consolidated and unified management are reflected in this annual statement.

Gross earnings for 1929, as reported in the corporation's preliminary income statement and now confirmed, are $115,150,313, compared with $107,195,658 in 1928 and $96,756,479, which shows a steady increase each year. Net earnings are $40,207,134 against $36,806,573 in 1928 and $31,355,554 in 1927, an increase of 28.2 per cent since 1927, which reveals an improvement in the operating ratio.

Net income applicable to the preferred and common stock of the corporation after all charges is $32,161,139 against $29,155,584 in 1928 and $23,265,753 in 1927, an increase of 38 per cent over the three-year period.

HAVRE GAS SUIT

CASPER, Wyo., Mar. 1.—The city council has filed suit claiming the Havre Gas Co. franchise requires the company to pay the city 5 per cent of its gross revenue. The claim for 1929 was $7,343.47.

A. H. Perkins, representing the Perkins-Jones interests, has applied for a franchise to lay mains and serve Havre with gas and it will be submitted to the citizens in a special election.

"Automatic Control

Improves and Simplifies Refinery Operation"

In the absorption process, for example, the correct application of temperature and pressure is a vital factor in economical operation—

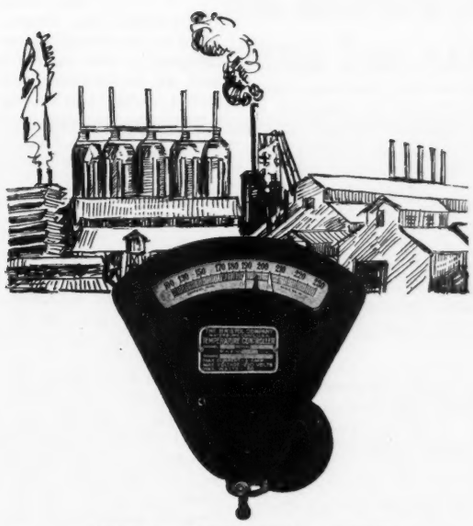
Temperature affects the volume of the gas being treated; the efficiency of extraction; character of absorbed hydrocarbons; and absorbing capacity of the oil.

Pressure likewise determines volume, but also controls the velocity of flow and the saturation of the absorbent.

To maintain these various temperature and pressure factors constantly in line with predetermined schedules is the function of Bristol's Automatic Control Equipment.

Such Control Equipment can be installed to automatically regulate the temperature of furnaces, stills, ovens, etc., using oil, gas or steam as the heating medium. It can also be adopted to control pressure within desired limits up to 12,000 lbs. per sq. in.; the levels of liquids, and rate of liquid flow.

Have Bristol's Sales Engineers explain in detail the remarkable savings made possible by correct use of automatic control. This Engineering Service is without obligation. Write nearest Branch office or direct to—



Bristol's Thermometer Thermostat Controllers can be furnished to automatically regulate temperatures in desired ranges up to 1000 F. Other types of Bristol Control are available for use up to 3000 F.

THE BRISTOL COMPANY
Waterbury, Conn.

Branch Offices
Rialto Bldg., San Francisco
747 Warehouse St., Los Angeles
National Bank Bldg., Denver

Philadelphia	Detroit	Boston	Akron
Pittsburgh	St. Louis	New York	Chicago
Birmingham	San Francisco	Los Angeles	Denver

BRISTOL'S *Recording and CONTROL* INSTRUMENTS

MEN KNOWN IN OILDOM

J. J. Downey

J. J. Downey, chief engineer and superintendent of refineries, harbors and pipe lines of the Rio Grande Oil Company, was born in Flagstaff, Ariz., in 1894 but spent much of his later life in the oil fields of Pennsylvania as assistant to his father, who was a refinery superintendent. His early experience was gained in the construction and operation of skimming plants and lub stills as superintendent of construction and maintenance.

Upon his return from two years' foreign service in the World War, Mr. Downey became affiliated with the Great Southern Refining Company in Kentucky as vice president and general superintendent, subsequently removing to California where he became superintendent of the Rio Grande Oil Company's Vinvale refinery in August, 1926. Since 1928 he has had general charge of all expansion work undertaken by the Rio Grande in California. During this period the company rebuilt all of its refining facilities at the Vinvale refinery, constructed two new Jenkins cracking units, enlarged its pipe line facilities, and built two loading wharves.

As superintendent of construction, Mr. Downey had charge of construction work on the Rio Grande Oil Company's submarine pipe line at Elwood and the construction of a new marine terminal at Los Angeles Harbor. This also involved the erection of storage facilities and the laying of several pipe lines from tidewater to the refinery. Mr. Downey also directed construction of the company's case oil plant at the Vinvale refinery.

PERSONAL PARAGRAPHS

William B. Weston, of Shawnee, Okla., was in Tulsa on a business trip Thursday and Friday.

* * *

James A. Lupfer, of the Worthington Pump Company, Tulsa, is in the East on a business trip.

* * *

R. T. Short will be in charge of the office which The Texas Company is opening at San Antonio, Tex.

* * *

H. E. Marsh and A. R. Denison, of the Amerada Petroleum Corporation, Fort Worth, Tex., have been visiting Tulsa.

* * *

John M. Lovejoy, president of the Petroleum Bond & Share Corporation, of New York, is in Tulsa for a brief visit.

* * *

Arno Behnke, assistant superintendent of the Texas division of the Amerada Petroleum Corporation, was in New York City recently.

E. M. Skeehan, of the Barnsdall Corporation, left last week for Los Angeles, Calif., where he will spend several weeks on business.

* * *

E. G. Dunbar and R. F. Imbt, independent operators of San Angelo, Tex., have returned home from a business trip in Fort Worth, Tex.

* * *

R. B. White, sales manager Chicago office, of the Valvoline Oil Company, has been making his headquarters at the New York office for several weeks.

* * *

John B. Corrin, Pittsburgh, Pa., vice president of the Hope Natural Gas Company and allied companies, is spending a few weeks in Florida.

* * *

B. L. Majewski, vice president in charge of sales, Shaffer Oil & Refining Company, is recovering rapidly from an operation for appendicitis.

* * *

Peyton Birdsong, geologist and assistant land man for the World Oil Company, Fort Worth, Tex., has returned from a business trip to West Texas.

* * *

A. M. McQueen, vice president of Imperial Oil, Ltd., and Mrs. McQueen, of Toronto, left recently for a visit of several weeks to the Peruvian fields.

* * *

James W. Taylor, at one time president of the Gulf Production Company, has recently been elected president of the Donaldson Oil Company, of San Antonio, Tex.

* * *

John M. Carson, of the Lake Petroleum Company, was the winner of the bridge prize at the Valentine party of the Spencer Petroleum Company. There were 44 contestants.

* * *

Carl B. Gammons, assistant secretary of the Crown Central Petroleum Corporation, Houston, Tex., has returned from a trip to New York and other eastern points.

* * *

Ray Kelley has been appointed assistant manager of distribution by the Shaffer Oil & Refining Company. He had been with the Home Oil Company, a subsidiary of the Shaffer company.

* * *

Harry C. Wiess, vice president of the Humble Oil & Refining Company in charge of refining, Houston, Tex., accompanied by Mrs. Wiess, has been on a short trip to New York.

* * *

Paul Gaurin, of the Shell Petroleum Corporation production department, located in Tulsa, is recuperating from his recent operation for appendicitis at St. Johns Hospital, Tulsa, and is expected to leave there about March 1.

* * *

T. J. Hughes, Sr., well known oil producer of Cushing, Okla., is on a month's trip to Cuba, Porto Rico and the north coast of South America recuperating from a recent sickness. He is expected back about March 15.

* * *

Edward Cousino, manager of the fuel oil division, Acme Petroleum Company, Chicago, is expected to be able to be at his office the coming week. He broke the bones in his ankle before Christmas and has been confined to his room.

* * *

C. B. Page, of the Steam & Combustion Company of Chicago, together with Karl C. Schmidt, consulting engineer with the Freeman Boiler & Engineering Company, also of Chicago, spent several days last week in Tulsa and the Oklahoma City Field.

* * *

The Empire Gas & Fuel Company is transferring Harold D. Herndon, geologist, from San Angelo, Tex., into the Fort Worth office, and F. S. Prout is being transferred to Tyler, Tex., and will cover the East Central Texas district, which is one of the most active areas of Texas at the present time.

* * *

T. C. Banta has been placed in charge of the New York office which the Smith Engineering Company has opened at 90 West Street. Mr. Banta formerly was connected with the Graver Corporation and previous to that connection was engineer for the Producers & Refiners Corporation with headquarters in Tulsa.

John Gibson, of Shreveport La., will be in charge of the office which the Lion Oil Refining Company recently opened at San Antonio, Tex.

* * *

Scott Turner, director of the United States Bureau of Mines, has just been elected vice president and director of the American Institute of Mining and Metallurgical Engineers. In addition, he was recently elected chairman of the Washington, D. C., section of the same organization.

* * *

Harry H. Power, the new chairman for the Mid-Continent section of the A.I.M.&M.E., returned to Tulsa Thursday morning from the annual meeting of the Institute held in New York City, and reports a very active meeting with a great number of good papers presented and discussed.

* * *

E. M. Cline, scout for the Shell Petroleum Corporation, Big Spring, Tex., is now in the company's district offices at San Angelo, Tex., taking the place of James T. Peace, chief scout of the district, until Mr. Peace recovers from injuries sustained in an automobile accident last week.

* * *

William Ford has been elevated to the presidency of the Bolsa Chica Oil Corporation to fill the vacancy created by the recent death of Irving V. Augur. Francis B. Gormley and S. A. Reed remain secretary and treasurer respectively. E. Ord Slater and Dora D. Augur were elected members of the board.

* * *

Harvey T. Kennedy, who for six years has been engaged in formulating specifications and devising tests for lubricants and liquid fuels as well as supervising these tests at the United States Bureau of Standards, has resigned to accept a position with the research laboratory of the Gulf Production Company, at Pittsburgh, Pa.

* * *

J. T. Peace, chief scout for the Shell Petroleum Corporation, San Angelo, Tex., was seriously injured in an automobile accident, and Tom Williams, formerly a land man with the same company, but now an independent operator at San Angelo, received slight injuries when a tire blew out on the latter's car, turning it over four times, demolishing it. They were making a return trip to San Angelo from Christoval when the accident happened.

* * *

M. J. Monroe, sales manager; D. T. Monroe, district manager; W. C. Arnett, South Texas district manager; E. W. Berry, district agent for the Humble Oil & Refining Company, Houston, Tex., have been making a tour of West Texas and visiting the company's refinery at McCamey, its gasoline plant at Iraan in the Yates Field, and making the rounds of the stations in the West Texas district.

* * *

George B. Murphy, for the past five years associated with the Atlantic Refining Company, has resigned to join the engineering staff of the Universal Oil Products Company of Chicago. Mr. Murphy became associated with the Atlantic company in 1925 and since 1927 has been supervising engineer in charge of cracking operations. He was formerly employed by the Mid-Continent Petroleum Corporation, Tulsa.

* * *

John M. Crawford, president of the Parkersburg Rig & Reel Company, Parkersburg, W. Va., and Mrs. Crawford, are at Palm Springs, Calif. Tom O'Donnell, first president of the American Petroleum Institute, has a private golf course at Palm Springs, and Mr. Crawford, Capt. J. F. Lucey, of Dallas, Tex., president of the Lucey Petroleum Company, and Mr. O'Donnell make three of many a foursome on Mr. O'Donnell's fine course.

* * *

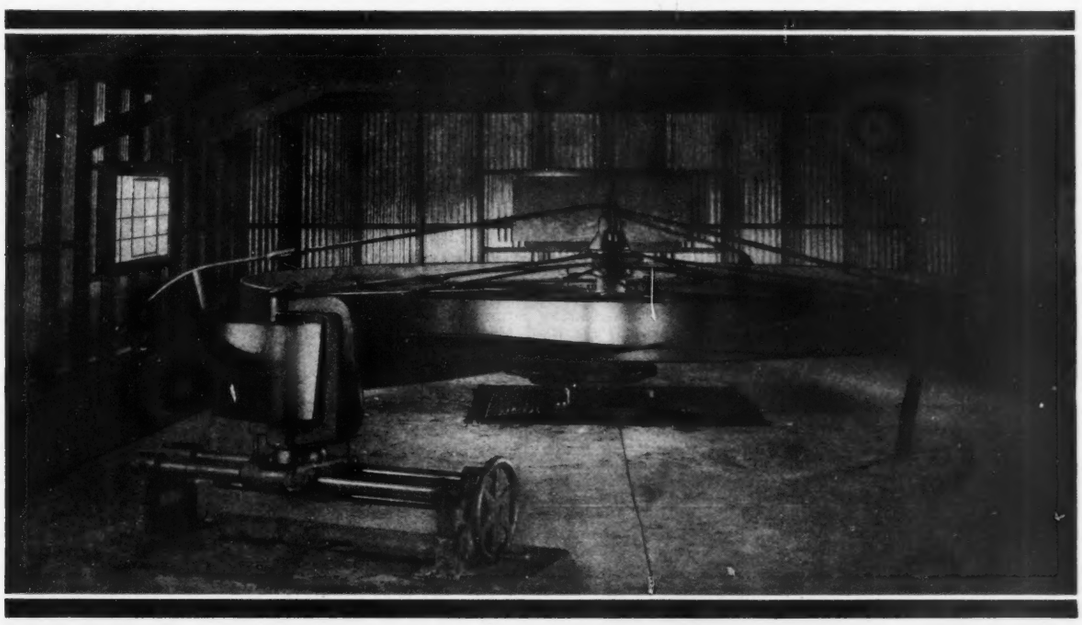
Harry P. Carroll, district manager of the Dixie Gas & Fuel Company at Beaumont, Tex., effective March 1, was transferred to Houston, Tex., as operating manager of the Houston Gas & Fuel Company. Both companies belong to the Moody-Seagraves group owned by the United Gas Company of Houston. Mr. Carroll was succeeded at Beaumont by W. B. Curry, formerly of Nacogdoches. Mr. Carroll has been in the gas business for 19 years, being associated with companies distributing gas at Beaumont. Starting as an office boy in the original Beaumont Gas Company he worked up until in 1917 he was made general manager at Beaumont and then a year later was made district manager.

The Pedestal Assembly ..... is Adjustable .....

An Exclusive Feature of

"OILWELL" Bandwheel Powers

This feature provides an easy means for vertical alignment



OIL WELL SUPPLY CO.

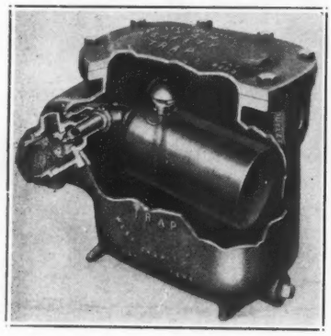
NEW YORK—LOS ANGELES—PITTSBURGH, U.S.A.—SAN FRANCISCO—TAMPICO—LONDON

WORLD'S OLDEST AND LARGEST MANUFACTURERS OF OIL FIELD EQUIPMENT

EQUIPMENT AND SUPPLIES

MAKE STEAM TRAP THAT HAS BREATHING ACTION

The normal operation of the K. & M. safety steam trap, made by the K. & M. Steam Engineering Co., West Orange, N. J., is that of "breathing," that is the



float is rising and falling, opening and closing the valve, thus trying the line for condensate.

Steam, water and air enter the inlet, pass through the valve orifice, through the hollow spindle and into the float. Steam entering the float forces the condensate from the float through the discharge tube into the casing until the buoyant force produced is sufficient to raise the float and close the valve. This happens before the water seal at the bottom end of the discharge tube is broken. Consequently no steam escapes to the casing. The discharge tube has a vent hole at the top and the float a hole in the bottom which allow water to enter the float from the casing, cause the float to fall and the valve to be opened. So long as nothing but steam is entering the breathing action continues.

When nothing but condensate is entering the float is at the bottom of the casing. The valve is wide open and remains so until steam enters the inlet. Air entering the float passes through the vent hole. In case of large volume of air, the trap may operate as under steam but this operation does not interfere with the elimination of air from the system. A water level is maintained in the casing even with the outlet; condensate and air entering the casing from the discharge tube flow are forced through the outlet.

NEW INTERNATIONAL TRUCK

The new 3-ton speed truck, Model A-5, announced by International Harvester and now on display at all International branches, is designed to meet a wide range of hauling requirements, incorporating features that contribute to improved performance and operating economy. The new model is built in four wheelbases, 156-inch for dump and semi-trailer service; 170, 190 and 210-inch for general hauling of all kinds. The longer wheelbases provide for maximum body lengths (back of cab) as follows: 170, 190 and 210-inch wheelbases; 13 feet, 15 feet and 17 feet 6 inches respectively. Two and one-half-yard dump bodies of 9 feet or 9 feet 6 inches in length may be mounted on the 156-inch wheelbase chassis. Outstanding among the features of this new International are the new six-cylinder engine with its seven-bearing crankshaft, seven-bearing camshaft, and removable cylinders; the single-plate clutch with built-in vibration damper; a new and exclusive transmission with five speeds forward and one reverse; new spiral bevel gear drive axie; the latest type mechanical four-wheel brakes; heavy pressed steel channel tapered frames, and others of equal importance.

FLEXIBLE STEEL BELT LACING IS INTRODUCED

A complete line of flexible steel belt lacing has been placed on the market by Armstrong-Bray & Co., Chicago, called by the trade name of "Steelgrip." The lacing is made of a selected heat-treated steel of great toughness and tensile strength, yet hard enough so that the points of the lacing will penetrate the toughest belts and stand long and continuous use with the minimum of wear. The joint of the lacing is made with a

steel rocker hinge pin composed of two segments, one rocking against the other and absorbing all of the wear at the joint when going over a pulley. The only tool needed to apply the lacing is a hammer.

Steelgrip can be used on leather fabric or composition belts and is especially recommended by the manufacturers for use on conveyor work. It is made for belts three-sixteenth inch to one-half inch thick and for any width.

C. P. BRANCH OFFICE IN TULSA

Chicago Pneumatic Tool Co., New York, announces the opening of a branch office in the Philcade Building, Tulsa. George J. Lynch has been appointed district manager in charge of this office and the territory it serves. The Tulsa office will handle all details of the sale and servicing of compressors, engines, pneumatic tools, electric tools, vacuum pumps, condensers and rock drills. The company recently opened an office and service station in Oklahoma City for exclusively handling the CP Tucone rock bit and that office will continue in the same capacity.

VOLTAGE FLUCTUATIONS FAIL TO AFFECT METER

The Brown electric flow meter, introduced by the Brown Instrument Co., Philadelphia, Pa., is said to remain accurate even though the line voltage should vary 30 per cent up or down. This indifference to voltage fluctuations is an inherent characteristic of the inductance bridge principle. The smallest movements of the manometer float are transmitted, owing to the elimination of "steps" by the inductance bridge principle. By simply counting the marks recorded on the chart rim the operator can read the volume of flow that has taken place during any period. This feature is made possible by the automatic recording planimeter.

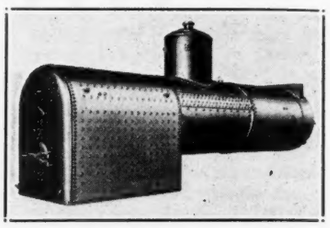
The record never is found jammed along the edge of the chart; the range can easily be changed to bring the record back near the chart center where it has plenty of room, an advantage accomplished by simply changing the "range tube." The instrument is easy to install and convenient to use, because the integrator is built into the recorder and has a plain five-figure dial which anyone can read at a glance. The mercury cannot be blown out of the manometer pressure chamber by flow changes because the manometer has an automatic mercury seal.

SALVAGING EQUIPMENT

The salvaging of old equipment of oil companies is the subject of a bulletin issued by the Bureau of Mines. Suggestions are made for securing the best results by systematic and intelligent care of old material. It is stated that oil companies are now paying attention to their salvage work with the result in saving a large amount of money. Well organized and efficiently operated salvage departments pay large dividends to an oil company whatever its size or scope of operation may be, says C. P. Bowie, author of this report.

NEW BOILER EQUIPPED WITH THERMIC SIPHON

The Californian, latest thermic syphon-equipped boiler, is announced by the Oil Well Supply Co., Pittsburgh, Pa. The Californian was designed especially for



California oil fields by practical oil men and engineers of that State. In addition to complying with A.P.I. specifications, this boiler is said to meet the demands of the Department of Industrial Relations, industrial accident commissions of the State of California. Its weight is within the California road limits. It is built also in accordance with the A.S.M.E. code, and complies with the regulations of the National Boiler Board.

In this advanced, open-bottom type oil field boiler, the newest and most exclusive feature is the adoption of the Nicholson thermic syphon, used with success in locomotive practice. The action of the thermic syphon induces water circulation quickly and positively, completely circulating the entire volume of water in the boiler in a few minutes.

This increased circulation results in more even temperatures throughout the boiler. Steaming capacity is increased because the syphon adds materially to the firebox heating surface. Uneven temperature stresses are reduced, making for longer life. In addition to increasing the general efficiency of the boiler with reduced fuel and maintenance costs, the thermic syphon provides a safety feature in case of low water. Its spouting action, caused by exceedingly rapid evaporation within the syphon itself, protects the crown sheet, preventing serious property damage or loss of life. It serves to keep the crown sheet flooded with water should the water level in the boiler drop below the top of the crown sheet.

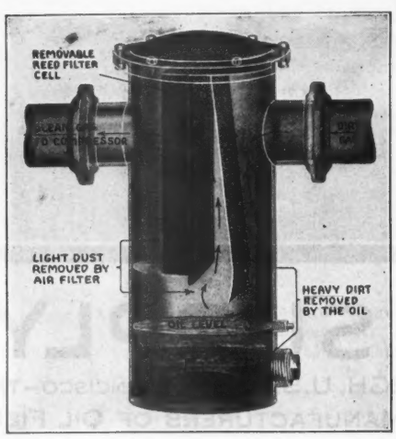
Seamless steel boiler tubes are beaded and pressured in the firebox tube sheet. These tubes are literally spaced with large bridges and arranged in vertical and horizontal rows including a self-cleaning effect. Hand-hole and man-hole plates have extra large stud bolts. All fitting connections are forged steel riveted to the plates. Provision is made for ample blow-off requirements.

The mud ring is made from a 3 by 4-inch steel bar, forged and shaped entirely by special machinery to insure uniform metal distributing throughout. The corners are not welded in any manner. The ends of the bar are butt-welded after it has been shaped. The bar then is annealed, giving it a soft texture which lends itself readily to expansion and contraction. All rivet holes in the plates and nut ring are drilled from the solid after assembly, assuring perfect alignment and fit. This prevents rivets from shearing. Sufficient rivets are provided at the inside and outside corners to produce great strength and rigidity of the firebox and to reduce to a minimum the possibility of leakage around the mud ring.

The Californian is designed to operate at 200 pounds working pressure.

CLEANS NATURAL GAS BEFORE IT ENTERS COMPRESSOR

A new gas filter suitable for cleaning natural gas before it enters compressors has been placed on the market by the Reed Air Filter Co., of Louisville, Ky. The entering gas is deflected downward, where it is brought in close contact with oil in the bottom of tank. A large percentage of heavy dirt such as sand, pipe scale, etc., is caught in the oil. The gas then passes through a regular Reed filter cell, identical in construction with the Reed filters in general use throughout the oil industry for the protection of air compressors, oil and gas engines. Any remaining dirt is caught by this filter cell.



The Reed gas filter is guaranteed by the manufacturer to remove from 97 to 99 per cent of all solid impurities in the gas. One of the features of this filter is that by preventing a large percentage of the dirt from entering the filter cell, the cell can remain in service for a much longer period before it is necessary to clean it.

This filter is designed to withstand a maximum operating pressure of 300 pounds, and a special unit for higher pressures can be furnished if desired.

The Reed gas filter is offered in two sizes, type A and type B. The type A has a capacity of 1,150,000 feet of gas, and the type B has a capacity of 1,750,000 feet per 24 hours, at atmospheric pressure. At 300 pounds pressure the type A filter will handle approximately 24,000,000 feet of gas, and the type B will handle 36,000,000 feet. Capacities at intermediate pressures will vary accordingly. This gas filter is also suitable for use on vacuum pumps and for cleaning gas furnished gas engines.

L. Ford Merritt has been appointed manager of the Detroit office for the Union Chain & Manufacturing Co., Sandusky, Ohio.

We have for Sale ONE REFINERY

BROWN CORPORATION STRAUSS

At a Fraction of Original Cost...

we offer all material and equipment of the MILLIKEN REFINERY at Arkansas City, Kansas...Buildings...and site of 155 acres situated almost in the heart of Arkansas City.

STORAGE TANKS

This refinery equipment includes 500,000-bbl. tankage . . . in excellent condition, varying in lower ring thickness from ¼" to ½" . . . including:

62,800 bbl. Gasoline Tankage
13,100 bbl. Bleacher Oil Tankage
30,800 bbl. Distillate Tankage
9,225 bbl. Lub. Oil Tankage (all horizontal tanks).

Also includes several hundred thousand barrel tankage originally used for Sweat House . . . Wax . . . Steam Still Storage . . . Crude Oil . . . Reduced Neutral . . . Wax Receiver . . . Fuel Feed . . . Fuel . . . Petrolatum . . . Clay Wash Naphtha . . . and Bright Stock Mixing.

125 Ton Capacity CARBONDALE WAX PLANT

Including motors, steam pumps, settling tanks, chain-driven barreling machine and equipment, ammonia pipe coils, wax separators, brine coolers, and wax presses. This modern wax plant is a real bargain—offered for sale as a complete unit or any part thereof separately.

This plant — and all other equipment — is in excellent condition, having been operated on sweet crude oil only.

Whatever your needs—this material will save you money. An inventory of all equipment and materials will be mailed you on request. Write, phone or wire for information to our Arkansas City office!

It Will Pay You
To Get Our Cash Offer
for YOUR
Abandoned or Obsolete
Plants and Equipment

BROWN-STRAUSS CORPORATION

ARKANSAS CITY, KANS. *General Offices* KANSAS CITY, MO.

EQUIPMENT AND SUPPLIES

IDECO TRAVELING BLOCK HEAVIER AND STRONGER

The new Ideco heavy-duty streamlined traveling block, made by the International Derrick & Equipment Co., is designed to meet the increasing demand for heavier and stronger drilling equipment. The number of parts has been kept at a minimum. The block has no projections to catch on the finger board or to interfere with fast operation. It is of the "overbalanced" type, proportioned to prevent overturning or fouling of the lines, with weight to insure its rapid fall in the derrick without a load.

This traveling block consists of five 36-inch sheaves made in either manganese or Idecalloy steel, with ground grooves conforming to A.P.I. specifications for 1-inch or 1⅛-inch wire line. The large sheaves reduce the bending stresses in the line and materially lengthen its life.

The center pin is 6 inches in diameter, made of forged alloy steel, heat-treated, American heavy-duty roller bearings with 1-inch rollers and hardened steel inner and outer races are used. The inner races are fitted over the center pin and are keyed to prevent rotating. No wear is imposed upon the center pin. Positive lubrication is insured through the use of the Alemite pressure system. Individual oil tracks to each sheave are drilled in the center pin, so that each sheave can be lubricated separately.

The side plates and spacer plates are made of heavy steel plate, separated by spacers mounted on the upper and lower pins. These plates are accurately made and serve as an additional support for the center pin. The becket is made of cast steel, stands permanently upright, is stream-lined and is fastened to the side bar by means of a 4-inch diameter alloy steel pin. The lower bail is made of 4½-inch forged steel suspended from a 4-inch diameter lower pin.

Side bars are 6 feet 3 inches long made of heavy cast steel. Lock nuts are provided throughout. Rope guards of the built-in type are made of heavy steel plate, quickly detached by the removal of two bolts. The overall width of the block is 27½ inches. The overall length is 8 feet 1½ inches and the weight 5,400 pounds.

VIBRATION STRENGTHENS GRIP OF SCREW THREAD

The Dardelet self-locking screw thread, manufactured in the United States under license from the Dardelet Threadlock Corp., New York, is a new thread with a profile mathematically designed according to precise calculations of the various stresses to which screw threaded fastenings are subjected. It is said to lock perfectly by reason of its specially designed profile and the locking action is effective at any point along the threaded length. Auxiliary locking devices are unnecessary. The locking action is effected without injury to the thread with the result that threaded parts can be adjusted readily and can be used repeatedly.

The Dardelet screw thread is offered as a solution of the age-old problem of so designing a thread profile that vibration will tend to tighten, rather than loosen, the grip of the threads. It presents no production difficulties to the manufacturer of screw threaded products. It is produced by taps and dies in the usual manner, and by hot and cold rolling. Dardelet bolts and nuts are of solid metal throughout, without any hidden devices, moving parts, springs or auxiliaries of any sort. They are simply ordinary bolts and nuts threaded with the Dardelet thread, which is produced with the same basic equipment as the V thread. All standard bolt, nut and screw machines, tap and die holders, and die heads can be used without change except to substitute Dardelet taps, chasers and dies.

The Dardelet thread is adapted to bolts and nuts, studs, screws, threaded parts of engines and machinery, and for many special applications. For special uses it can be made in alloy steels, in non-corrosive metals, and with various rust proof and plated finishes.

Wherever screw threads are used as a fastening the Dardelet thread is said to assure easy, quick and economical assembly. On equipment encountering vibration or shock, it is a factor of safety and economy.

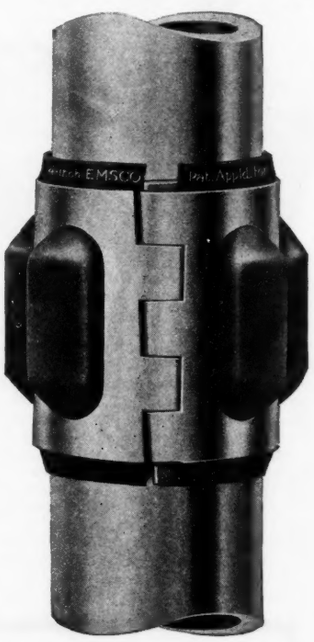
In appearance the Dardelet screw thread closely resembles the Acme thread. The difference is that the Acme thread is in effect a flat-faced spiral wedge wrapped around a perfect cylinder, with clearance giving a certain amount of sidewise play. In the Dardelet thread as applied to bolts and nuts the bottom of the groove or root of the bolt thread, and the corresponding crest of the nut thread are tapered about 6°, and instead of sidewise play there is a certain amount of endwise play.

SIVYER AND NUGENT COMBINE

The directors of the Sivyer Steel Casting Co., Milwaukee, and the Nugent Steel Casting Co., Chicago, have announced the consolidation of their companies. Both Sivyer and Nugent have come to be recognized as among the outstanding electric steel foundries in the United States. Both have been active in the research and pioneering of new alloy steel castings to meet special conditions. The management say they expect by combining to provide greater and more flexible facilities for the handling of their large alloy tonnages. The new company will have a production capacity of 1,400 tons per month, of small and variable section castings in high carbon and alloy steels. The two-plant set-up provides exceptional flexibility. Casting can be segregated by type to provide more routine foundry practice. Production can be stabilized. The alloy business of both foundries can be centralized in one foundry under close control. The combined organizations will function under the name of the Sivyer Steel Casting Co., with the home office in Milwaukee.

SMITH PERFECTS EMSCO PROTECTOR FOR CASING

In the Emsco free-circulation protector the E. M. Smith Co., Los Angeles, Calif., has developed a tough rubber casing protector embodying improved features according to W. G. L. Smith, vice president. In explaining the manufacturing process, Mr. Smith said the Emsco protector rubbers were made flat, in shallow moulds, and cured in the flat position under 200-ton hydraulic pressure to insure solid structure, toughness and strength. "At no time during manufacture, while being installed or while in service, are Emsco rubbers expanded," said Mr. Smith. "Therefore, they are not subject to injury by a destructive cut or tear."

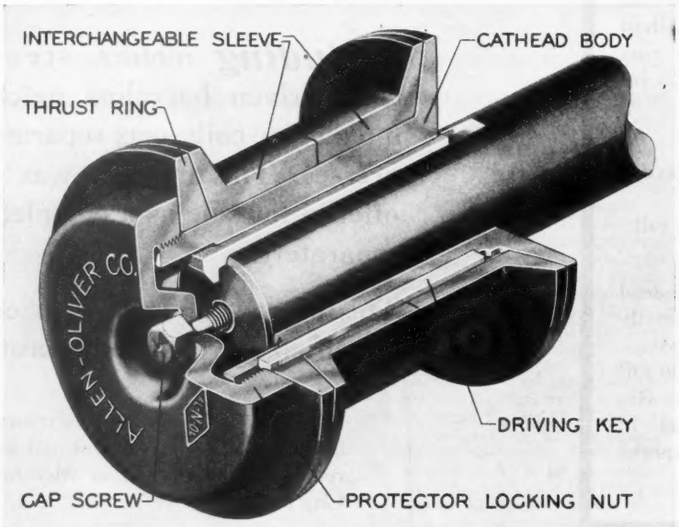


The tough rubber offsets or "bumpers" are an integral part of the flat body, and when a protector is placed on the pipe the rubber is still in a flat position. A strong steel cage, with perforations through which the rubber offsets protrude, holds the protector firmly in place on the pipe and protects it from injury by irregularities in the hole.

This new protector, according to the company, does not restrict circulation, because the circulation space provided is greater than the volume of fluid forced through the rotary here; it obtains a firm grip on the pipe and will not slip up or down, pile, or overlap; it can be installed in about 35 seconds without the use of heavy or intricate accessories; it can be removed easily from the pipe when pulled out, thereby allowing full salvage value; it is light in weight, making the protectors easier to handle; it insures a dry pulling job because the free circulation space prevents the protector from pulling the fluid out of the hole when coming out with a string of drill pipe; it cannot be destroyed by the oil men when circulating with oil or oil and water, because only the rubber offsets and the extreme top and bottom edges of the Emsco protector are exposed to the circulating fluid.

Emsco free-circulation protectors are made to fit all standard sizes of drill pipe. They stack well in the rig, require little space, will not roll, and can be stacked on ends or sides quickly and easily.

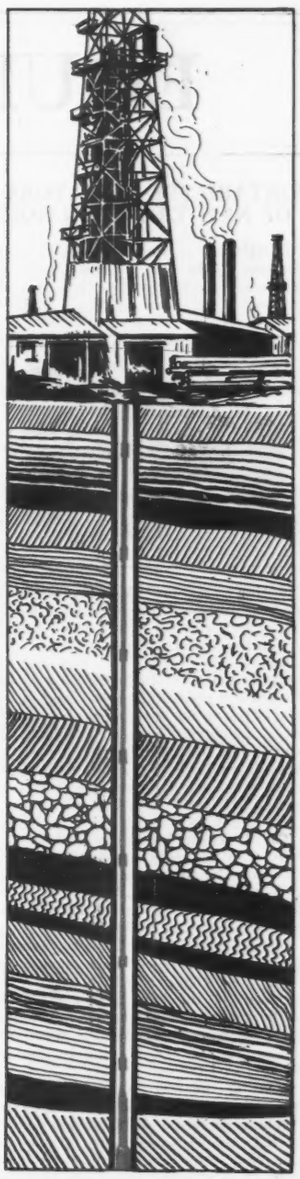
SLEEVE-TYPE CATHEAD HAS RENEWABLE WEARING FACE



The new Al-N-Ol sleeve-type cathead, designed to eliminate the necessity of removing catheads from line shafts and sending them into the shop to be built up with the torch, has been introduced by the Allen-Oliver Co., Inc., of Los Angeles, Calif. This cathead has a renewable wearing face, consisting of a pair of reversible liners which are keyed to the main spool casting. The liners are heat-treated and hardened so that should the innermost half become line-cut, it is an easy matter, according to the manufacturers, to reverse the position of the halves, or substitute a new piece with minimum loss of time and at a nominal cost. The Al-N-Ol cathead is said to save wear and tear on tong ropes and cat lines. It can be furnished for any type of draw works line shaft.

Other Al-N-Ol products include kickless calf wheel and draw works brake, automatic safety cathead, high-pressure slush pump piston, double-seal slush pump valve, rotary jars, core drills, four-way drilling bits and well surveying machines.

Your bits belong here



DOWN IN THE HOLE DIGGING AWAY —

BLACKOR

will keep them there

THE longer you can keep your bits down in the hole...actually cutting...the quicker you will reach oil and the less your hole will cost. That's what Blackor does! When applied to the cutting edges of your bit...it armors the bit against rapid abrasion and prevents frequent pulling of the string to attach sharp bits. Under ordinary conditions a change takes 2 1/2 hours for the round trip at 4000 feet; 3 hours at 5000 feet; 4 hours at 6000 feet and 5 hours at 7000 feet. In general the formation in the deeper zones is harder and dulls bits more quickly than the formations near the surface, therefore even a small increase of hole drilled per bit decreases costs and increases drilling speed.

In actual drilling, Blackor-ed bits have given from 3 to 5 times longer life than unfaced bits and 10 times longer life is not uncommon. Put Blackor on your bits and note the difference!

Ask for Catalog.

PROTECTED BY AMERICAN PATENT PROTECTION CORPORATION

Licensed Under Patent Numbers:

1,613,942	1,424,536
359,925	30,021
16,347	15,311
2,580	1,069

Reissue No. 17,323
Other Patents Pending

Blackor is granular in form and is one of the hardest materials known and the most resistant to abrasion. It is applied with the carbon electric arc. Requires no previous experience to apply. Your welder can do it.

BLACKOR COMPANY

Head Office: 13,007 South Main Street
Los Angeles, California

New York Export Office: 39 Cortlandt Street
Tulsa, Oklahoma Office: 410 Thompson Bldg.
Houston, Texas Office: 616 Public National Bank Bldg.

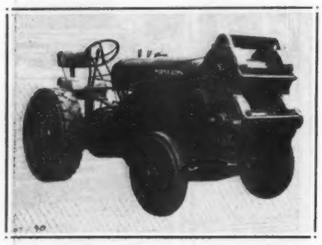
BLACKOR

The Super Abrasion-Resistant Facing

EQUIPMENT AND SUPPLIES

PORTABILITY A FEATURE OF NEW TRACKSON HOIST

Portability is one of the biggest advantages of the new Trackson hoist, put on the market by the Trackson Co., Milwaukee, Wis. This machine, built for



mounting on the McCormick-Deering tractor, provides an efficient, flexible unit which can be driven from one job to another under its own power.

Among the variety of uses for this equipment are moving derricks and boilers, pulling rods, tubing and casing from oil and gas wells, erecting tanks, skidding heavy machinery, loaded trailers, etc., pulling big trucks up steep inclines and through mud holes and soft ground, and many other oil and gas field operations that can be handled to best advantage by a hoisting unit.

The Trackson hoist, designed by J. E. Dale, who has been associated with the Trackson Co. for years, is built to stand up under hard usage. Its simple, all-steel construction promises long life and maximum hoisting efficiency.

Installation is easy. The hoist is mounted on the power unit by means of 6-inch steel channels which extend from the front of the hoist and are attached to the tractor rear housing. The hoist may be mounted on either the wheel tractor or the Trackson crawler-equipped McCormick-Deering.

Some of the features embodied in the Trackson hoist are improved screw-type clutches, oversized drum shafts and increased cable capacity, hand lever control and ready adaptability from the single drum to a double-drum type hoist.

BROWN SAILS FOR MARACAIBO

The American Iron & Machine Works Co., Oklahoma City, Okla., has announced that T. A. Brown will sail for Maracaibo, Venezuela, on March 8. Mr. Brown will be a special representative of the company in the sale and service of its products in the South American territory. His headquarters will be in Maracaibo. The American Iron & Machine Works Co. manufactures a wide line of oil field equipment.

T. A. Brown

BAASH-ROSS OPENS FIELD SHOP

The Baash-Ross Tool Co., Los Angeles, Calif., opened a new field shop last week at 1559 East G Street, Capitol Hill, Oklahoma City. The shop carries a full line of Baash-Ross tools for rental and sale and is equipped for day and night service in pipe-slotting, perforating, inside and outside threading, all types of repairs and general machine work. George Dudney is in charge of the shop, with A. V. Cox as sales representative, and a full staff of experienced oil-field mechanics.

NEW WELDING MACHINE ANNOUNCED BY WILSON

To meet the need for a small, lightweight arc welder, suitable for operation in limited space, the Wilson Welder & Metals Co., Inc., Hoboken, N. J., has brought out a 100-ampere machine which promises to be an important addition to welding equipment, particularly adaptable for repair work. This new welder (one hour rating on fixed resistance 50° C. rise) combines major operating features of the large capacity machines with unusually light and compact construction. It has a welding range of 30 to 125 amperes. Three models are available: Electric motor driven, gasoline engine driven, and arranged for belt drive.

TRADE LITERATURE RECEIVED

The Petroleum Rectifying Co., of California, Los Angeles, has prepared a bulletin on "The Petreco Process for the Electrical Dehydration of Crude Oil Emulsions," an instructive publication on treating cut oil.

The General Electric Co., Schenectady, N. Y., has prepared an illustrated booklet of 24 pages on "Electric Equipment for Handling Heavy Material," and new bulletins on enclosed magnetic switches and quiet operating induction motors.

An illustrated article on fire protection in the aviation industry is among those in the current number of "The Modern Fire Chief," published by the American La France & Foamite Corp., Elmira, N. Y.

The Westinghouse Electric & Manufacturing Co. has published a circular on high capacity oil circuit breakers designed for operation on circuits requiring breaker with large interrupting capacities.

An article on "Falcon Electrically Heated Compound Melting Tanks" has been reprinted from Fuels and Furnaces as a bulletin by H. O. Swoboda, Inc., Pittsburgh, Pa.

Ready for distribution to the manufacturers of heavy-duty machinery and equipment is the attractive new 76-page catalog of the American Roller Bearing Co., Pittsburgh, Pa. This company specializes in roller bearings for heavy-duty service. American bearings are manufactured in three types, "medium duty," "heavy duty" and "super heavy duty." The catalog is profusely illustrated.

THIS FOAMITE ENGINE SUITS THE OIL FIELD

Mud, sand, gumbo, railroad tracks, ditches, or rough going of any kind hold few terrors for the new Foamite engine, the "Wideway." Built by the American-LaFrance and Foamite Corp. of Elmira, N. Y., this new portable fire-extinguishing device is recommended by the manufacturers for use about oil-producing properties because of its rugged construction to stand hard knocks and its wide roller-bearing wheels that make for easy pulling.

The Wideway engine is a new unit of Foamite protection. The solution tank is mounted on a sturdy carriage with steel wheels fitted with roller bearings and wide tires with 8-inch treads. Long pulling handles and a convenient draw rope also help to make it easy to get the engine to a fire quickly regardless of the ground conditions.

The inner construction of the Wideway provides for the metering of the two chemical solutions used so that about 300 gallons of firefoam are produced which smothers the fire under an air-tight blanket of foam. The stream of firefoam is discharged at an effective range of 50 to 60 feet which permits an operator to attack the fire without suffering from heat or smoke. The Wideway engine is also recommended by the manufacturers for use at airports and industrial plants where obstructions, or mud, or snow, or sand in yards or grounds present an obstacle to quick action against fire.

BUSINESS NOTES

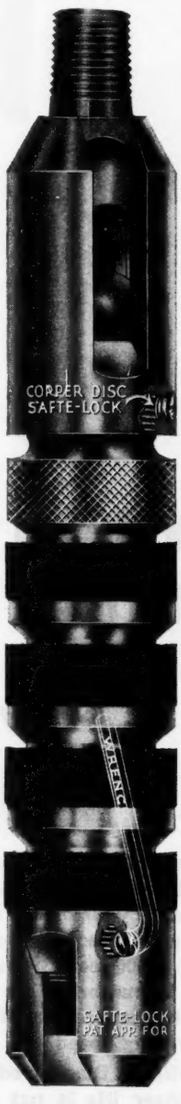
Charles A. Clark and James Burrows have organized Clark & Burrows, Inc., to deal in contractors' equipment, with headquarters at 3600 Commerce Street, Dallas, Tex. The firm will serve as the North Texas distributor for the National Equipment Corp.

The Foxboro Co., Inc., Foxboro, Mass., has removed its Los Angeles office to 2307 East Eighth Street. Dudley M. Hill will be in charge, with an entirely new staff of engineers.

For his paper on "A New Development in Wrought Iron Manufacturing," the Robert W. Hunt medal has been conferred by the American Institute of Mining and Metallurgical Engineers upon Dr. James Aston, director of mining and metallurgy at the Carnegie Institute of Technology, and consulting metallurgist of the A. M. Byers Co., of Pittsburgh.

SAFTE LOCK DESIGNED TO REDUCE VALVE TROUBLES

The Safte lock traveling valve, manufactured by the Petroleum Equipment Co., Fort Worth, Tex., was designed to eliminate the difficulties encountered as a result of bottoms and crowns of valves unscrewing while in operation. The Safte lock is a positive and simple locking device. There are no additional parts to the valve other than the machining of the crown and bottom to accommodate the Safte lock. No amount of pounding or vibration will loosen a crown or bottom after the Safte lock has been set, according to the manufacturers. The threads on the valve body are protected by the Safte lock copper disc.



The Safte lock traveling valve is machined in the Petroleum Equipment Co.'s own plant, from the solid cold-drawn steel bar. The steel is an alloy especially adapted to this type of equipment. The machine work is in keeping with the company's requirements for precision and exactness.

PATENTED

The Petroleum Chemical Co., Tulsa, announces that its application for a patent covering its improved process for breaking of petroleum emulsion has been allowed by the United States Commissioner of Patents.

TRANSFERRED TO LOS ANGELES

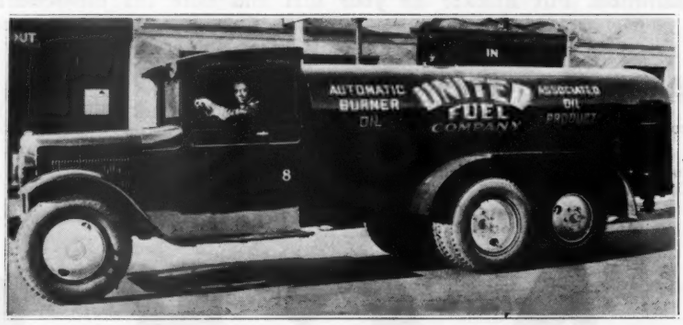
Allen Schawalder, formerly a member of the research engineering department of the Pittsburgh Equitable Meter Co., Pittsburgh, Pa., has been transferred to the branch factory in Los Angeles, Calif., where he will have charge of the service engineering department.

IDECO OFFICE IN PITTSBURGH

The International Derrick & Equipment Co. has opened new division offices in the Grant Building, Pittsburgh. James H. Dye will be in charge as division manager.

A bulletin from the Westinghouse Electric & Manufacturing Co. describes the application and construction of twin-motor and single-motor oil-well cable-tool drilling equipment.

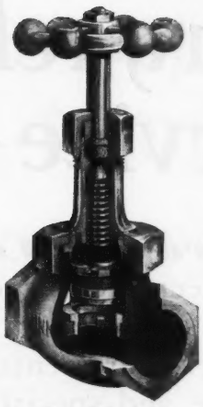
AUTOMATIC BURNER OIL CARRIED BY SPECIAL TRUCK



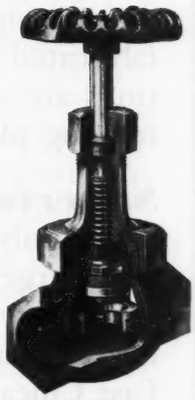
An interesting special motor truck delivering automatic burner oil is this Dodge eight-wheeler owned by the United Fuel Co. of Seattle, Wash. The extra set of wheels trailing the rear duals is known as a Maxi-Unit. Dodge trucks have been used for several years by the United Fuel Co. to haul coal. The special unit pictured was decided upon after Dodge Brothers transportation engineers and officials of the fuel company had made a study of the type of transportation required to deliver fuel oil to the steadily growing number of oil-burning industrial and domestic heating plants.

Why dont Beaver's Teeth wear out?

Because they automatically renew themselves. As the teeth show signs of wear, more tooth grows out to take the place of that which has worn off.



Iron Body "Ferrenewo"



Bronze "Renewo"

The complete Lunkenheimer line includes valves of bronze, iron and steel; gate, globe, angle, cross, check, blow-off, non-return, pop safety and relief valves; lubricators, oil and grease cups; cocks, whistles, fittings, etc. Descriptive literature will be sent upon request.

Renewability of parts subject to wear is a prime factor in the long life of Lunkenheimer Valves. The measurement of all parts is accurately gauged in manufacture, positively assuring that any replacement part will be exactly the same size as that which is to be renewed.

This feature coupled with the characteristic sturdy over-all construction of Lunkenheimer Valves means a practically permanent installation, with continuous satisfactory performance, infrequent repairs and low maintenance expense.

Lunkenheimer Valves are an investment that yields gratifying returns in long-time, low-cost service.

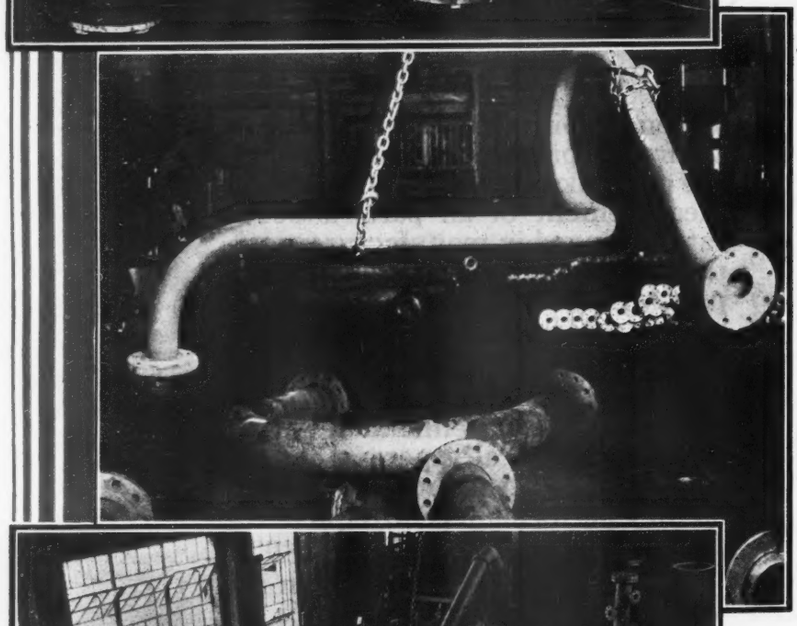
Distributors located in all oil centers, carry Lunkenheimer Valves and Engineering Appliances in stock. They will serve you promptly.

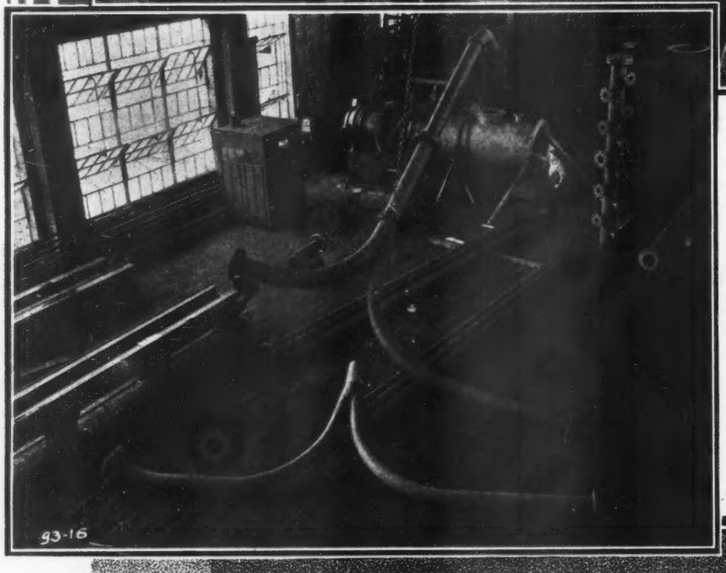
THE LUNKENHEIMER CO.
"QUALITY"
CINCINNATI, OHIO, U. S. A.
NEW YORK CHICAGO BOSTON PHILADELPHIA
PITTSBURGH SAN FRANCISCO LONDON
EXPORT DEPT. 318-322 HUDSON ST., NEW YORK

LUNKENHEIMER
VALVES

102-56-31

LIMB BUILDS for every refinery service ----





For a Third of a Century leading engineers here and abroad have turned to Limbert for their most difficult piping requirements. Limbert fabricated pipe and special steel fittings are serving leading power and refining plants the world over.

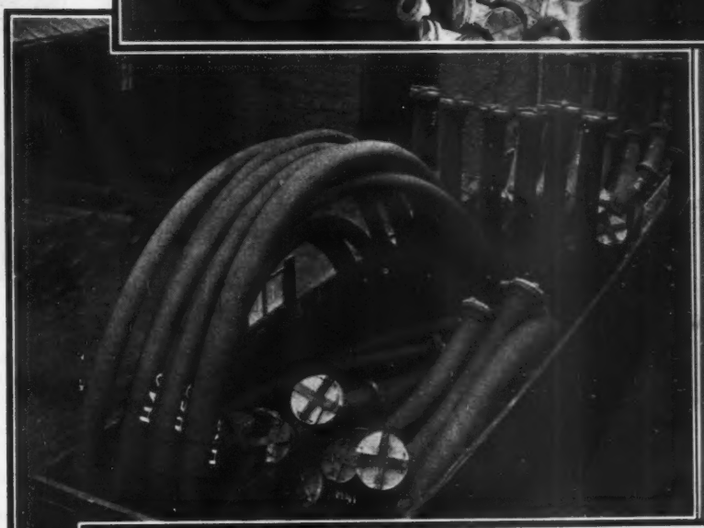
Superior Plant Facilities. The Limbert fabricating shop has a very large capacity for this difficult type of work, and is located in the heart of the Chicago steel district, at East Chicago. Limbert reputation for quality work is a by-word among pipe specialists.

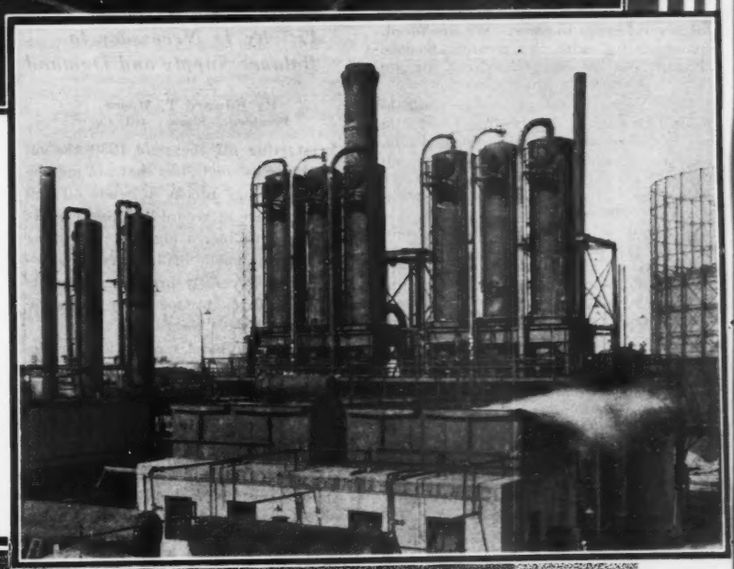
Fast Production Facilities enable Limbert to give unequalled serv-

Pipe Bends
Process Piping
Headers—Cast or Welded
Van Stoning and all types of flange work
Welded Piping
Complete Power Piping
Valves and Fittings
For all pressures—for all temperatures and every service

ERT PIPING

for every pressure and temperature-



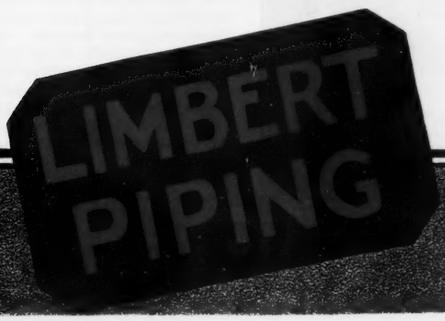


ice where quick delivery is essential. Special fittings in cast iron, semi steel or cast steel, which are the items causing most delay on any job, are made right in Limbert's plant from their own patterns.

Outstanding Engineering Service has always been a feature of Limbert facilities. Limbert engineers are ready to assist you in any possible way in manufacture or in design. Every Limbert job is completed under the supervision of an engineering staff of specialists who, day after day, are producing piping for the most extreme requirements of pressure and temperature.

Use Limbert to manufacture standard or to design and manufacture special piping requirements for your hardest jobs.

Geo. B. Limbert & Co.
560 Fulton Street, Chicago, Ill.
Works: East Chicago, Ind.



OGJ 3-6 Gray

Executives View Refinery Outlook

Leaders in the Industry Express Their Opinion on Present Situation and Indicate Basis for Improvement

Year Has Seen Greatest Uneconomic Expansion in Oil Refining Capacity

By D. J. Moran
President Continental Oil Co.

The past year records the greatest uneconomic growth in oil refining capacity so far witnessed within the life of the industry. On the other hand, it must be acknowledged that economic yields from a barrel of crude have surpassed in development any previous attainment.

There are few cities of any size that cannot boast of an oil refinery of some character. Such institutions may be a result of promotion on local capital or

constructed by some major unit. A gasoline deluge has been the result. A tremendous amount of capital has been expended for facilities much beyond the consuming demand for current needs or those for several years to come. We are faced, consequently, with a greater menace through overbuilding than anything we have experienced in overproduction.

Here again the measure of accomplishment has been in barrels processed and not in dollars of profitable return. Pride, vanity, and competition for size have been contributing factors. In this activity, we have been flying above the clouds without a compass or altimeter.

It is conclusively evident that few companies have been sufficiently deliberate in correlating all of the pertinent factors that should be basic when considering refinery construction. Highly departmentalized units in the industy have, undoubtedly, limited themselves to a refinery departmental viewpoint solely. The evidence on every hand indicates an oversaturated market in refinery throughputs and sales outlets, applying to every state in the Union. The soundest turn of events would be for the industry's executives to realize that the statistics prepared by reliable bureaus mean something to their particular domain and that each barrel of capacity added to present plants means just that much more gasoline for so-called "dumpming." These same gentlemen could profitably declare a moratorium on refinery construction for at least a period of three years. If this were done, every other phase of the industry would quickly adapt itself, thus securing a balance which must be attained before we can consider ourselves on a firm footing.

MORE PRODUCT STANDARDIZATION WOULD AID MARKETING SITUATION

By Henry M. Dawes*
Vice President, American Petroleum Institute, Chairman, Marketing Division

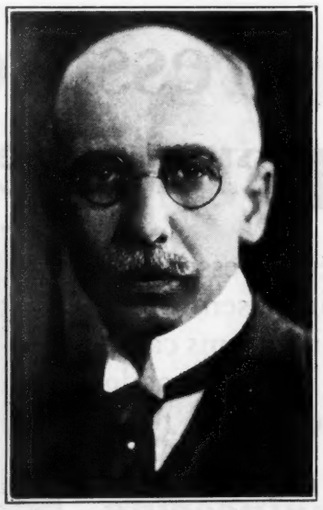
It seems reasonably clear that the industry is facing a year of unusually keen competition, which need not be destructive if a reasonable degree of self restraint and judgment and moderation is exercised.

The co-operative movements which have been inaugurated in the last year or two should be viewed as the first steps in an evolution whose objective should be the elimination of waste and the concentration of thought and effort upon that efficiency which can be obtained by the standardization of marketing practices. The desirability of the elimination of all forms of irregularity and secret rebating seems to be reasonably obvious from every viewpoint.

The tendency through advertising or other methods to exploit inconsequential differences in individual products at the expense of one's competitors is not sincere or sound advertising policy, and the development and promoting of specifications which offer no substantial benefit to the customer merely because of a peculiar and transitory situation on the part of the individual marketer results in an embarrassment to the whole industry and no permanent good to either the marketer or the public.

Some reasonable effort towards the standardization of products would be most desirable at this time, as it is hardly possible to form an intelligent base for a schedule when the same term is applied to a product which may vary in the cost of production, performance and specifications. Thought and effort along this line offer the same possibilities for constructive results as does the movement for reasonable marketing standardization, designed to prevent irregularities in that phase of the business.

I think, to use a hackneyed phrase,



we should remember that "Rome was not built in a day," and if in our co-operative efforts we have not accomplished all for which the optimistic had hoped, we have laid the foundations and are at least at work upon the structure. This is more than could be said a few years ago.

*President, Pure Oil Co.

Co-operation on Refining Activity Is Necessary to Balance Supply and Demand

By Edward T. Moore
President, Simms Oil Co.

In starting off the year 1930 the oil industry faces conditions that are not the most promising. Stocks of crude oil and of gasoline are at record-breaking heights and have been increasing at an alarming rate. By the middle of January, this situation was forcefully brought to the attention of Texas producers by a drastic reduction in crude prices.

On the other hand, production for the United States has been brought down fully 10 per cent from the peak figures attained in August of last year. Voluntary co-operation and curtailment by producing companies have not only accomplished this downward trend but give promise of still further reduction.

More than 12,000 marketers of refined products have subscribed to a sounder basis for the distribution of gasoline and lubricating oils, with a strong tendency toward the elimination of many of the bad practices that have afflicted this branch of the petroleum industry.

With the same co-operation that has been exemplified by the efforts of producers and marketers applied to the activities of refiners, then a proper balance between the economic supply and demand for petroleum products might easily be accomplished.

We face a situation that requires heroic measures. Prejudices and preferences must be laid aside, and in their place should be substituted curtailment and co-operation. If this is done, the end of this year will be much more promising than its inauspicious beginning.

Refining Industry Must Accept Its Responsibility In Avoidance of Waste

By Edward G. Seubert
President Standard Oil Co. of Indiana

We are in general satisfied with the way 1930 business has started. We have faith that the year will see an agreeable upward trend from which all who are operating on a sound basis can profit.

Conservation of petroleum is attracting more and more attention with the public. The responsibility for avoiding waste must be accepted by refiners as well as producers. We must strain every effort in refining to take out of crude oil the maximum possible amount of the higher fractions in order to meet the growing demand for motor fuels and lubricants with as little crude as possible. This is a problem for research laboratories, refinery managers, and technicans generally. Though great progress has been made in

refining it is probable that we have only begun to realize the possibilities of getting values out of petroleum. Another problem which can well be faced is that of finding additional and better uses for the heavier fractions so as to reduce as much as possible the necessity for putting them to uses for which other materials can be obtained. This is all part of the movement for conservation.

In marketing, the industry needs to extend application of the code of practices, which has already done much to eliminate unfair business methods. Healthy competition is essential to sound development, but consumers as well as marketers suffer in the end from unsound and reckless competition. Perhaps the time has come when more thought might well be given to avoid unwise duplication of outlets. A code of ethics in advertising petroleum products might appropriately receive some consideration. Many other merchandising questions lie before us. The petroleum business has reached new heights of stability and dignity, but there is still work to be done to put it on an entirely satisfactory basis in all phases. Let us hope for additional progress in 1930.

Believes Conservation Program Will Spread In Refining Industry

By L. H. Prichard
President, Anderson-Prichard Oil Corp.

The year 1930 seems to really promise a new era in the oil industry as a whole, starting with the splendid conservation program inaugurated by the crude oil producers, and now being intensified. This program of conservation will undoubtedly spread throughout the refining industry

and operations will be gauged upon demand for refined products rather than capacity of plants.

The Code of Ethics, if given time and with proper co-operation, should bring better practices into the distribution and retail ends of the industry; all of which means conservative, economic handling of this valuable product so essential to our every-day welfare, all the way from the well to the final consumer.

Competition is probably more acute today in the oil industry than any other industry of like importance to the public welfare; all of which guarantees to the consumer an ample supply of product of the highest quality and at reasonable prices. We feel that the outlook, while conservative, is promising.

Says Refiners Must Reckon With Two Circumstances Of Extreme Significance

By P. M. Miskell
General Manager, Refining and Marketing Division, Empire Oil & Refining Co.

The present year appears to be one wherein the manufacturing programs of individual plants and groups of plants must reckon with two circumstances of extreme significance. One is that the industry will be called upon to atone for past mistakes and the other is that a more general recognition must be accorded advantages and the effect of these advantages on the volume of material that can be profitably marketed.

Last year refineries of the country produced approximately 2.2 per cent more gasoline than the market would absorb. The resultant increase of 10,000,000 bbls. to the stored supply occasions an expense the industry must continuously assume until eliminated by restricted production. If the present year was destined to be one of vastly increased demand, the overproduction of last year might be absorbed with little damage. However, at the present time we have no such assurance, and with a relatively small increase attempts to get out from under an expensive inventory will be much more difficult.

A review of the price history of gasoline discloses that the refinery price for the product has not reacted in line with increased material, labor and selling

costs. As the margin narrowed, it naturally intensified the necessity for economics in manufacture and distribution. An important reaction to this trend was a shifting in sources of market supply as individual plants and groups of plants made a more careful utilization of transportation facilities for both crude and refined products and strategic plant location became additionally important. The transportation of gasoline by pipe line is but one manifestation of the trend I mention. These circumstances are sufficient to render the current year one of difficulty and problematic prosperity to the industry and emphasize the unusual necessity for moderation in both production and the competitive attitude.

EFFICIENCY NEEDED IN MARKETING EQUAL TO PROGRESS IN REFINING

By Roy B. Jones*
President, Western Petroleum Refiners Association

No prospective outlook for the present year can fail to accord a very prominent position to the subject of overproduction. In the refining branch of the oil industry the surplus gasoline output of 1929 occasions one of the most distressing problems refiners are now facing. The inventory should be reduced, while an economic volume of current production must be maintained. Operations of the present time, however, are ill-adapted to relieve conditions, and the difficulties are intensified by increases in the yield of gasoline from an equal quantity of raw material, expansion of plant facilities, and resistance to the advantages of competitors. Probably the only relief from such a situation lies in a much more comprehensive study of true market demands and the abandonment, or at least moderation, of preconceived plans that are too ambitious.

The industry has every reason to expect a yearly increase in the volume of gasoline demand from year to year, under normal conditions of reasonable prosperity among consumers of the product, and until such time as mechanical improvements with respect to fuel economy, or utilization, are devised for motor cars. This year, however, the increase may be but nominal. Present conditions appear to warrant the advisability of moderate expectations. In addition, there seems to be much less than the usual certainty regarding the division of business between the various geographic groups of plants. The conditions, to be properly met, require that information that we have be practically applied.

Unfortunately the collection of marketing data has not been as freely and co-operatively undertaken as manufacturing data. In consequence the industry has suffered. In my opinion developments of last and the present year emphasize the fact that prompt action, based on constant study, is the greatest need. The untoward conditions I have mentioned should go far toward the establishment of new sources of information, a greater regard for the excellent information now at hand, and a clearer knowledge of what to do. It seems an intolerable condition that manufacturers of a necessity, such as gasoline, should so conduct

their joint affairs that market price should so frequently fall below the costs of manufacture.

It also seems probable the current year will see a continuation of the decided changes in consumers' requirements with respect to characteristics of gasoline. Quality is more essential than in the past and changes in gasoline have been required to keep pace with such factors as greater motor speeds, added car congestion, and differences in types of cars and engines. As in the past, the industry will undoubtedly adapt itself to the requirements of quality demand. Probably our greatest task should be to secure for our executive management an economic knowledge and efficiency in keeping with the efficiency we have created with respect to manufacture.

*President, Panhandle Producing & Refining Co.

Must Not Manufacture Without Assured Outlet Or Lose Fair Return

By R. C. Sharp
President, Independent Oil & Gas Co.

In our opinion there is little difference in the problems that face the refining industry in 1930 as compared with past years. The capacity of United States refineries and the annual increase of gasoline obtainable from a barrel of crude oil, make it unnecessary for the average concern engaged in the refining business to refine and store enormous stocks of gasoline during the slack season, as peak demands can now usually be supplied from current operations.

The cure for most of the present ills of the business, such as making gasoline to sell at less than the cost of production, lies within the control of every refinery executive. Each company should make only the amount of gasoline and other products for which it has an assured market at a profitable price. The trend toward integration on the part of most major oil companies, and many smaller ones, has removed from the industry many jobbing concerns in the Middle West which formerly have served as outlets for Mid-Continent refined products.

Mid-Continent refiners must come to the realization that competition from other areas, commonly known as pipe line refineries, and changes in the freight structure, have restricted to a certain extent their marketing territory, and if they continue to manufacture gasoline for which they do not have an assured outlet, either owned or controlled, they will continue to have a "feast or famine"

market, which, on the average, will not show a fair return on their increasing investment in refining facilities.

Budget Runs and Makes In Relation to Needs Instead of Capacities

By Harry D. Frueauff
Refining and Marketing Division, Henry L. Doherty & Co.

The safety factor of a few years back, namely, Spring gasoline stocks, is the danger factor today. Bigger yields per barrel, ample refining capacity, both make possible the supply as needed.

The sooner the industry realizes this

and operates accordingly, the sooner we will have a stabilized supply and at a price that laws of demand and costs would govern.

Budget your runs and makes in relation to your company's outlet needs, not by your capacities.

May Expect Betterment If Runs Are Not Increased And Stocks Are Held Down

By T. H. Barton
President, Lion Oil Refining Co.

The refiner is usually an optimist, but about the best that can be said at this time is that he is displaying conservative optimism.

It is now felt more than at any other time the industry needs the real honest co-operative understanding that a business of its magnitude deserves. It is hard for the layman to really understand, with the hundreds of millions of dollars invested in efficiently operated oil refineries, the high type of men who are directing these companies, and the great vital importance to every day business of the products manufactured, why the refiner must each year go through a period of depression and anxiety and why this important business should continually be compelled to look forward to even ordinary good conditions.

As has been ably stated recently by Arthur Brisbane, "The oil business is really a public utility." It requires but little thought to be convinced that the

gentleman is eminently correct as every business, family or person is directly or indirectly a consumer of oil products. This great important commodity should be properly preserved and protected for the use of all mankind.

The refining industry has been and is constantly changing. New methods of operation are being introduced to lessen the cost to the consumer but the margin of profits has in no manner kept pace with the technical betterments. Depreciation and obsolesence must be provided for, and to do this there must be more of a spread between cost and sale prices than merely manufacturing cost.

While our refined product prices have been consistently lowered, the various states have been creating gasoline tax and in many states this has been raised to the point where the tax nears the price of motor fuel at the refinery. Recent statistics show that gasoline taxes in the United States have increased 47 per cent over 1928 and are now 96 times as great as they were in 1921. The average automobile user does not always realize that largely through this medium his highways are built and maintained, and that only a minor portion of the retail gasoline price is realized at the refinery. The consuming and investing public should be advised of these facts by proper publicity as, to the average layman, the oil business is one surrounded by great mystery and yielding enormous profits.

If the refiners would honestly discuss their problems among themselves and would realize that a lessened production at a price which will result in a fair return is far better than an overproduction at a losing price, then they could exist on a sound business basis.

What the industry most needs is a Moses who has the courage to take this stand, with the realization that the business will not succeed by strangulation methods and that progress and prosperity must be shared, in a measure, by both the major operator and his smaller brother.

Experience has caused us to believe that the best conditions in the industry exist when the producer receives a fair price for his crude oil and a refiner a fair margin of profit. When crude oil prices are below economic values the tendency by the refiner is to lower his price accordingly and a chaotic condition in the oil business is brought about.

Proper crude oil conservation will go far to help the situation, and a material lessening of stocks above ground should go hand in hand with this movement as it will decrease the tendency by some companies to lower the price when storage is empty and raise it when storage is filled.

The producing and refining of oil cannot be too far separated as it is not economically sound that one phase of the industry be profitable to the disadvantage of the other, and it is not permanently possible that the refining branch be profitable unless the producing branch is also making earnings, dependent as they are one on the other.

There is no serious overproduction in the copper, steel, cement, aluminum or other important commodities which originate beneath the soil and which are mined and then refined. Obviously there is a reason.

Is it to be assumed, in this great industry of vast investments, brains and business acumen, which is producing a commodity so vital to everyday life and commerce, that the proper co-ordination cannot be brought about?

We may reasonably expect a betterment of prices and certainly more stable conditions for 1930 than have existed for the past several months if the refiners will not now increase their runs and storage of gasoline, and will not begin the heavy consuming season with stocks greater than of April, 1929.

PRICES OF ALL REFINED PRODUCTS DECLINE TWICE AS FAST AS CRUDE

By W. M. Irish*
Vice President, American Petroleum Institute, Chairman, Division of Refining

The newly organized division of refining of the American Petroleum Institute may be depended upon to provide the opportunity for refiners to work out co-operatively many of our technical problems and this work is expected to receive the general support of all those engaged in refining operations.

Refiners already have solved many of their technical problems. Through research, fuel economy has been increased, corrosion losses reduced, yields of desired products increased, and improvements made in the treatment of distillates, the extraction of waxes, the reduction of objectionable odors, the recovery of sludge acid, and so on. To a considerable extent knowledge of new methods and improved equipment has been available universally. There are grounds for confidence that other technical problems will be combated successfully.

The economic problems of the refiner have not been treated so happily. Practically all of the benefits derived from improvements in the quality of products and from the reduction of manufacturing costs have been passed on to the buyer. The refiner has shared the benefits only insignificantly and irregularly. The expanded refinery profits of the latter part of 1928 is an exception which proves the rule. In 1929 refiners received for their products about $100,000,000 more than they did in 1928; but their crude, at the well, cost them $162,000,000 more and they incurred the additional expense of handling about 90,000,000 bbls. more of crude. Over the past seven years the price of products collectively has declined twice as fast as the price of crude; and the price of gasoline has declined four times as fast.

Of course, the economic problems of refiners are interwoven with the problems of other divisions of the industry, particularly with those of the producing division. Over or underproduction of crude, which is beyond the control of refiners, affect margins favorably or adversely. On the other hand, over or underproduction of products, which is within the control of the refiner, affects margins adversely or favorably. To the extent that refiners control the relation between the demand for products and their output, they exercise a strong influence on operating margins. Moreover, the kind of enforced competition which leads producers to excesses through the drilling of offsetting wells, does not influence the refiners. There have been instances in four of the last five years when refiners, to their own hurt, produced excesses during periods when crude production was balanced with crude demand.

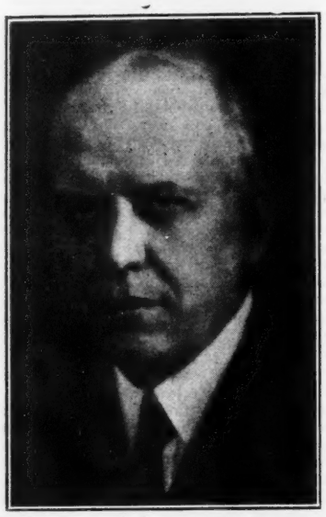
Overproduction of products leads inevitably to the reduction of refiners' margins through a decline of the prices of products relative to the prices of crude.

*President, Atlantic Refining Co.

In addition to the logical inference that refinery overproduction is a sure evidence of excessive investment in this branch of the business, overproduction is considered unsound for two further reasons.

First, the product whose output is in excess of needs probably, at a later date when required, could be produced at a lower cost. This conclusion is predicated on the fact that in recent years the trend of manufacturing costs has been downward. Moreover, quality requirements are changing. It is possible that when the surplus is required it will not possess quite the quality desired, necessitating additional expense for modification.

Second, since overproduction must be



followed by underproduction, it is responsible for the excessive overhead charges due to the partial use of equipment and organization during periods of underproduction and for devastating effects on employment and payrolls. Probably it could be said accurately that overproduction is directly the basic cause of wide fluctuations of prices, profits, and employment.

To a certain extent the refiner can control this important factor of the economic structure by producing for the market directly, or for the market indirectly through short-term storage, only such quantities of products as may be marketed profitably within the usual period assigned to such manufacture and storage. The refiner may to his advantage improve his situation by observing carefully the weekly refinery statistics published by the Institute and the monthly figures issued by the United States Bureau of Mines.

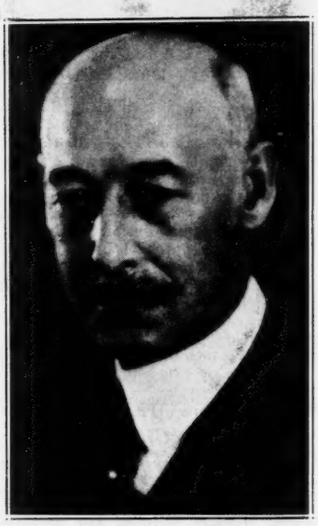
Sales Department Should Determine Size of Output As Measured by Demand

By G. C. Davison
President, Tri-State Refining Co.

If consumption and exports increase at the average rate of the past several years, we can reasonably look forward to a peak consumption in July or August of about 1,500,000 bbls. per day, and an average consumption of something like 1,250,000 bbls. per day. But if production is held steadily at 1,250,000 bbls. per day, it will bank up stocks to 58,000,000 or more barrels by April, and it will not be until late in the year that we can hope for reasonable prices—even assuming that average production for the year is held down to average daily consumption.

If, however, the industry could right now decrease its production by only 10 per cent, say to 1,150,000 bbls. per day, stocks could be brought down to a reasonable figure, and gasoline could be sold at a small profit. Later on in the year, as stocks are further reduced, runs to stills could be gradually increased to keep up with the demand.

As the greater part of gasoline comes from plants engaged both in skimming and cracking, there is a way for those plants to meet the situation much easier than in the old days when straightrun



gasoline only was made. With only one way to make gasoline, skimming, the refiner saw only one way to meet low prices. That way was to increase runs, to increase his division, and cut down unit costs. This in the long run produces still greater stocks and lower prices.

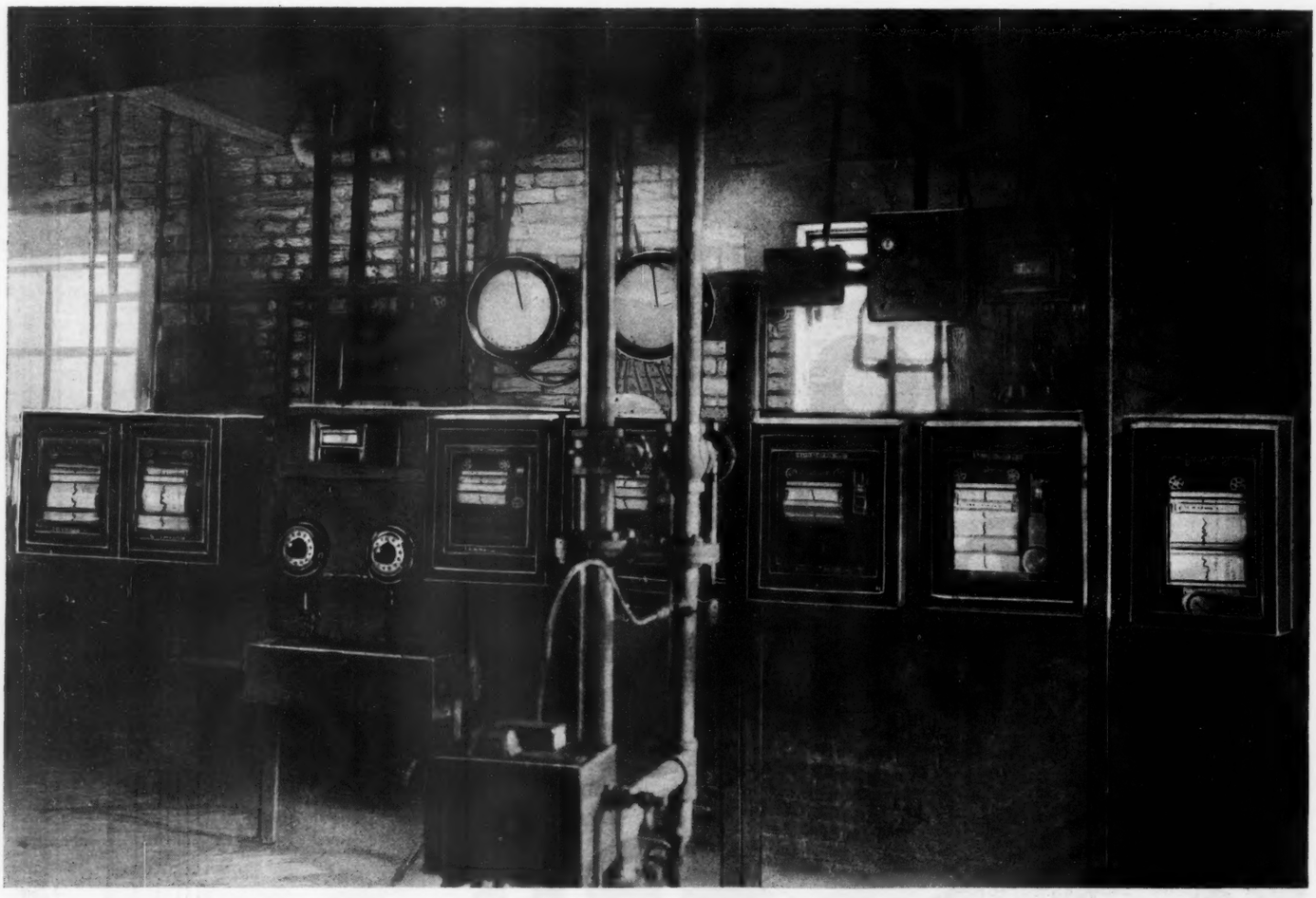
But with a combined skimming and cracking plant, the refiner has a means of meeting the situation without undue hardship.

Suppose, for example, a refiner finds he should reduce his gasoline output 10 per cent. He can do this in two ways. First, he can cut his crude runs 10 per cent, and get the same gasoline yield in per cent as before. But all cracking plants are elastic within certain limits. Depending on the amount of recycling, the per cent yield can be varied. Therefore, if it is desired to reduce gasoline output 10 per cent, crude runs can be reduced even more than 10 per cent. By more recycling, or cracking, the out-

(Continued on Page 257)

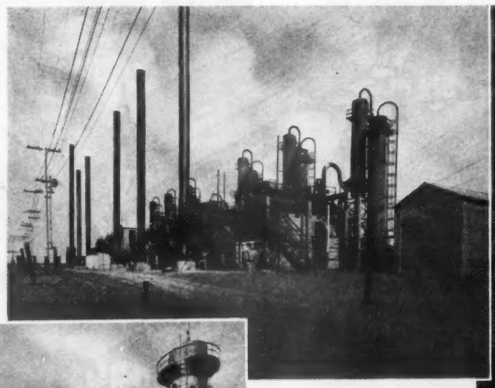
SKELLY OIL COMPANY

El Dorado, Kansas Tulsa, Oklahoma
Kansas City Omaha Minneapolis
WAREHOUSES IN PRINCIPAL CITIES



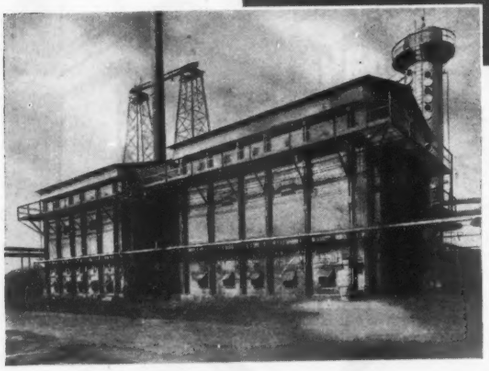
Control house panel board for Winkler & Koch Pipe Still.

AUTOMATIC CONTROLS



Jenkins Unit, Skelly Oil Co., El Dorado, Kansas, operating under Brown Automatic Temperature Control.

Brown Instruments at Skelly Oil Co., El Dorado, Kansas, controlling and recording kerosene and gasoline cuts from the Badger towers on crude stills.



Winkler & Koch Pipe Still, Skelly Oil Co., El Dorado, Kansas, operating under Brown Automatic Temperature Control.

Brown

To Measure

Brown Control Instruments for reflux and bubble tower on Jenkins Unit.

ON STILLS AND TOWERS
AT SKELLY OIL PLANT

THE Skelly Oil Company, at their El Dorado, Kansas, plant have several types of stills, pictured above.

Efficient operation of these various units requires close technical control.

Skelly officials called in Brown Engineers, and Brown Instruments are doing the job.

Whatever your refining products or still equipment may be Brown Control Instruments will meet the most rigid requirements of temperature, pressure, vacuum, flow or liquid level.

Brown Engineering Service is at your command. Write today for consultation, quotations or further details.

The latest feature of Brown Instrument Service is the new line of Brown Remote Type Instruments. Get a copy of Catalog No. 7501—just off the press.

THE BROWN INSTRUMENT COMPANY
4488 Wayne Avenue, Philadelphia, Pa.
Branches in 20 principal cities.

Automatic Controls
is to Economize

Lowering Crude Oil Storage Losses

Anglo-Persian Oil Co. at Abadan Develops Process for Stripping Crude of Light Fractions. Aids Refinery Operation

Engineering Department, Anglo-Persian Oil Co., Ltd.

The storage of crude oil is an unfortunate necessity which invariably results in the loss of some of the valuable volatile components of the oil. In certain circumstances this loss may reach serious proportions, especially where a gassy, volatile crude is stored in a hot climate. The problem of eliminating the loss, or at least, reducing it to a reasonable figure was encountered in a very acute form by the Anglo-Persian Oil Co. at its refinery at Abadan, which stands at the head of the Persian Gulf. Here the conditions are most unfavorable for storage.

The crude oil, as received at Abadan, has not been allowed to stand in tanks at any point on its route from the oil rock to the refinery. Indeed it has been kept under a positive pressure all the time, and in this way is made to carry in solution a considerable volume of natural gas which is required at the refinery for fuel purposes.

The bulk of the gas produced with the oil is, of course, separated at the wells, but this gas is stripped of its gasoline content by compression and absorption plants, and the wild gasoline injected into the crude oil pipe line. It will be appreciated that a crude oil of 39° A. P.I. gravity containing more than 30 per cent of straightrun gasoline in addition to some 3 per cent of compression gasoline and considerable quantities of gas, is very difficult to hold, even in a temperate climate.

High Temperatures

The climate of South Persia, is of course, by no means temperate; high atmospheric temperatures prevail throughout the greater portion of the year. In the summer months the crude oil itself reaches Abadan at a temperature of nearly 100° F. and a night temperature of 80° F. in the tank farm may be followed by the noontide shade temperature of 120° F. Sun temperatures of 175° F. are not uncommon. The evaporation and breathing losses occasioned by the great heat and wide fluctuations of temperature may be imagined.

In seeking to cope with these severe conditions, the Anglo-Persian Oil Co. gave the most careful consideration to all the well-known methods of avoiding storage losses. The linking up of nearly a hundred 70,000-bbl. tanks by means of vapor lines and gasometers was contemplated as well as the fitting of floating roofs, but another factor had to be taken into account, which largely nullified any advantage that might be gained by the adoption of the conventional method.

Approximately 25 per cent of the crude oil received at Abadan is exported to Europe, and the tankers carrying the oil necessarily pass down the Persian Gulf and through the Red Sea—one of the hottest portions of the globe. It is apparent that no system of floating roofs or gasometers or gas bags at Abadan could prevent the exported crude from suffering very high losses during the process of transshipment.

New Method

It is the purpose of this article to describe the method devised by the Anglo-Persian to overcome the difficulties with which it was confronted—a method which has been successful in reducing crude oil storage and transportation losses to a negligible proportion, as well as in offering marked advantages in the processing of the crude.

Both method and plant are extremely simple, the procedure being to remove the gas from the oil immediately it is received. The gas evolved is stripped of its gasoline and the latter stabilized, after which it can readily be held without notable loss. That portion of the gas-free crude which is later required for export is pumped to storage to await shipment while the remainder goes straight into the refinery ring main which feeds the distillation units. As it is desirable to ship as volatile an oil as can safely be handled, the export crude is degassed to the least possible extent consistent with low loss during transit. Normally about 2½ per cent of the oil by weight is removed in the process. The procedure is clearly illustrated in the diagrammatic flow sheet.

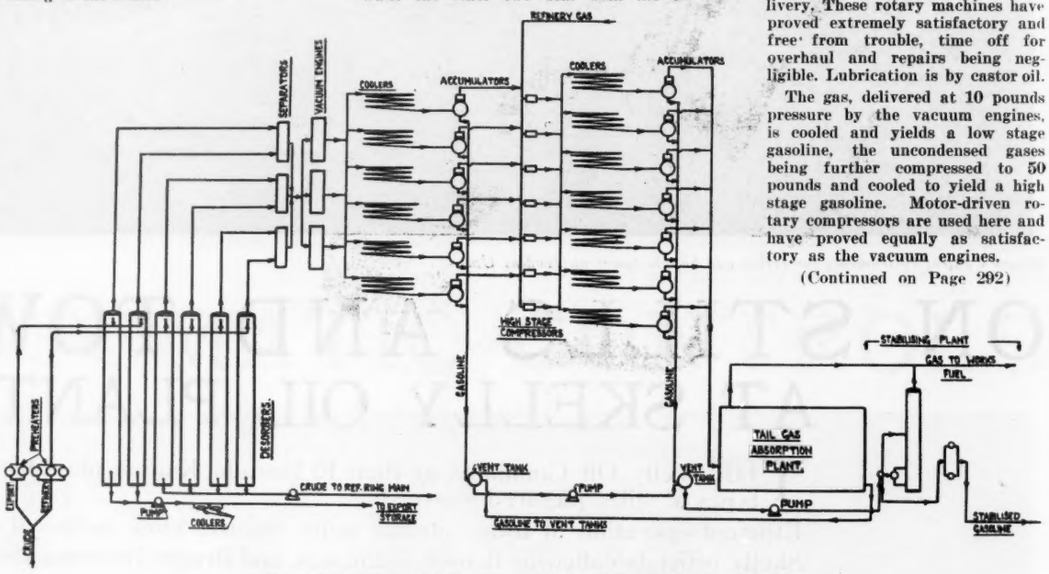
Removing Light Fractions

The plant consists of six towers or desorbers—so-called because their function is the reverse of absorption. Four of these towers handle the refinery crude while the other two deal with the oil required for shipment. All are 60 feet high by 6 feet in diameter and are packed with steel turnings. The main pipe line from the oil fields delivers the crude to pumps which pass it through steam heaters into the tops of the towers all of which operate in parallel. Heaters of the multitubular type are used, the temperature required being 120° F. in summer and 140° F. in winter. It will be seen that in summer hardly any steam is required as the oil enters the heaters at 100° F. The desorber towers are held under a vacuum of 15 inches of mercury so that the preheated crude disengages its gas as it flows down the packing and out at the bottom of the towers. Here it is picked up by centrifugal pumps and transferred to the refinery or passed through coolers to the tank farm according to whether it is destined for distillation or shipment.

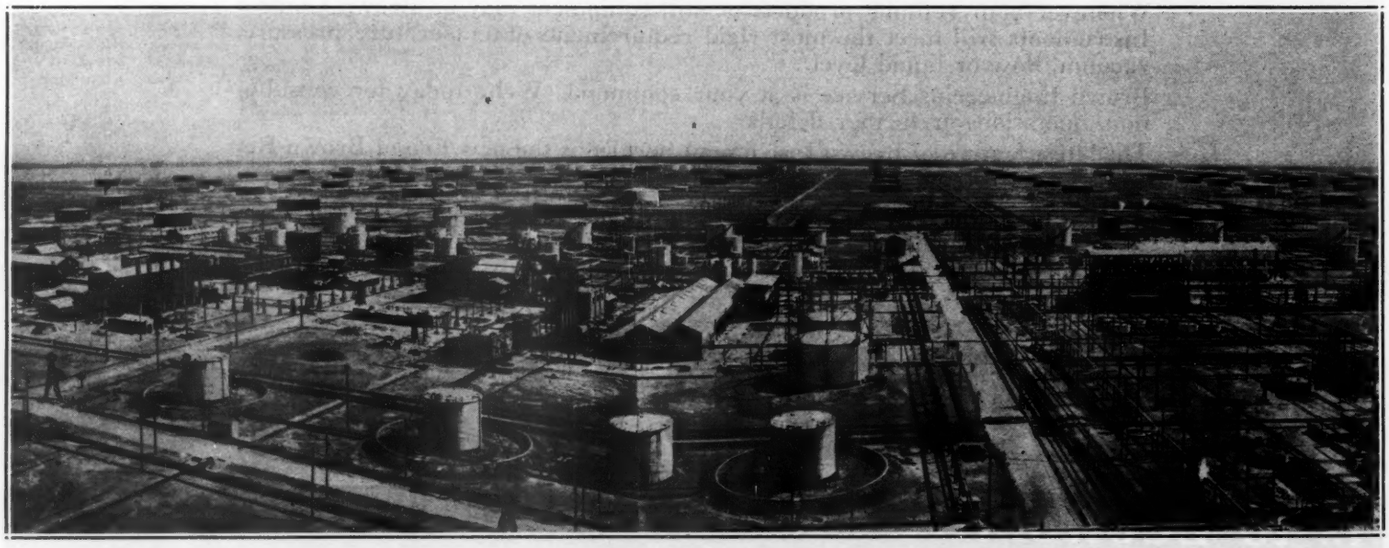
Maintenance of the vacuum is performed by rotary vacuum engines, which give 15 inches on the suction side, and 10 pounds' positive pressure on the delivery. These rotary machines have proved extremely satisfactory and free from trouble, time off for overhaul and repairs being negligible. Lubrication is by castor oil.

The gas, delivered at 10 pounds pressure by the vacuum engines, is cooled and yields a low stage gasoline, the uncondensed gases being further compressed to 50 pounds and cooled to yield a high stage gasoline. Motor-driven rotary compressors are used here and have proved equally as satisfactory as the vacuum engines.

(Continued on Page 292)



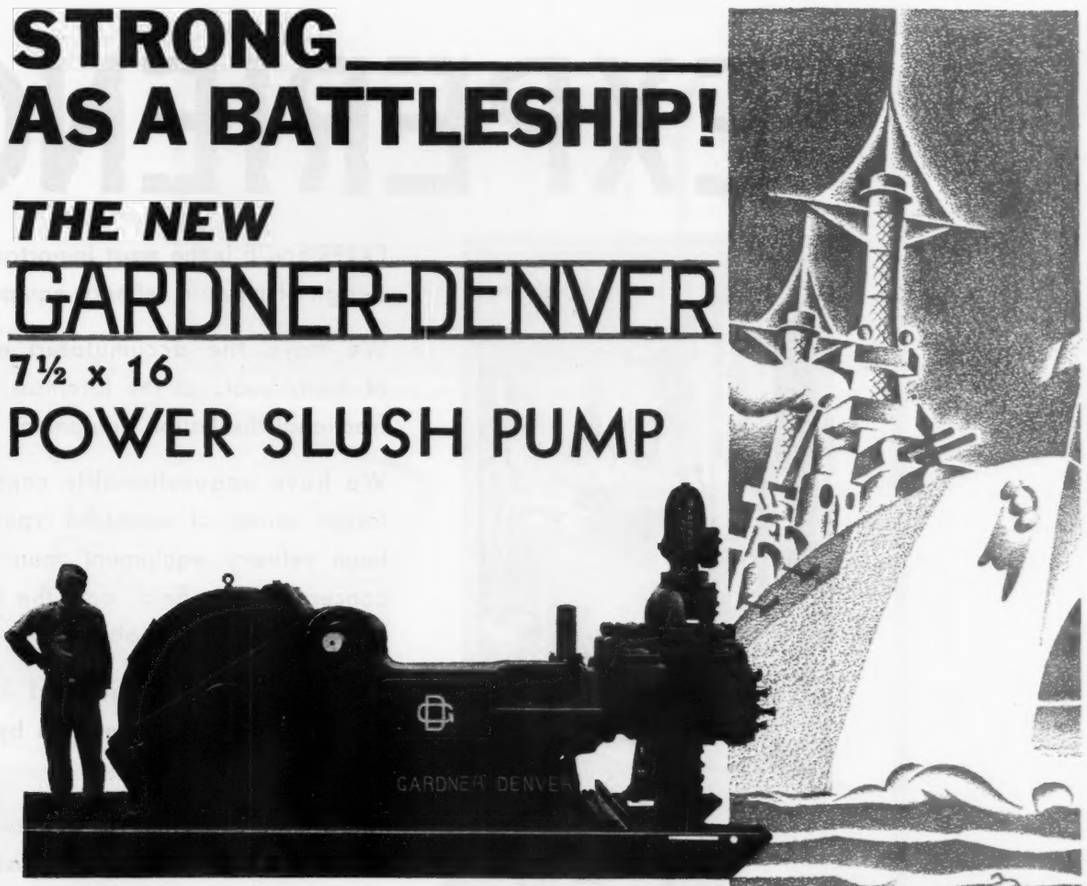
Flow chart of process designed to strip light fractions from crude oil.



Part of Abadan, Persia, refinery of the Anglo-Persian Oil Co., Ltd. Plant for stripping light fractions of crude oil shown in center of view.

STRONG AS A BATTLESHIP!

THE NEW GARDNER-DENVER 7½ x 16 POWER SLUSH PUMP



1. Conservatively Built for 200 H. P. Motor Drive » »
2. Rugged Cradle Prevents Weaving » » » » » »
3. Extra Sturdy Steel Eccentrics and Eccentric Rods » »
4. Roller Bearing Pinion and Main Shaft » » » » »
5. Proven Mud End » » » » » » » » » »

"If Continental Sells It....There Is No Better"

THE CONTINENTAL SUPPLY COMPANY
General Offices: ST. LOUIS

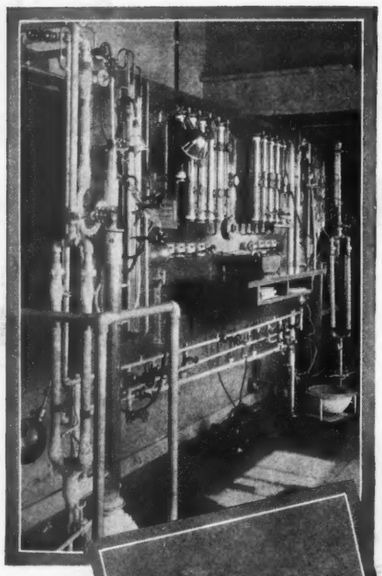
THE CONTINENTAL SUPPLY CO., LTD.
224 Traders Building, Calgary, Alberta, Canada

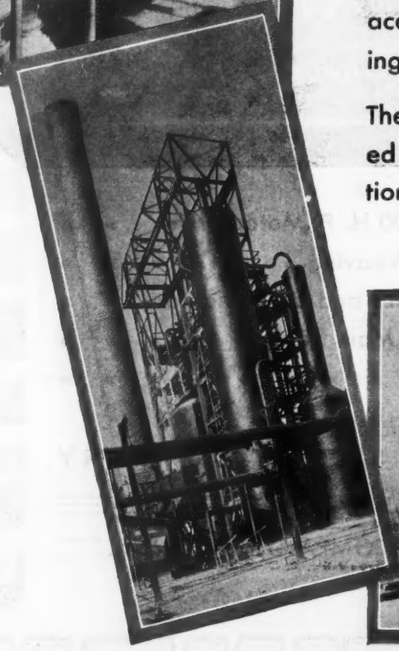
Export Offices: CONTINENTAL EMSCO COMPANY, INC. 74 Trinity Place New York
London Offices: 316-17 Dashwood House, Old Broad St., E. C. 2

J530

CONTINENTAL

EXPERIENCE





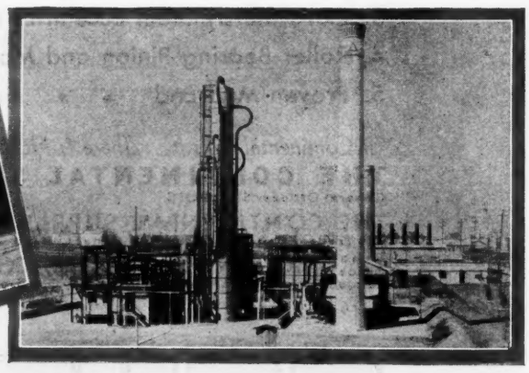
EXPERIENCE is the most important factor in design of modern refinery equipment.

We have the accumulated experience of many years as the foremost builders of fractional distillation equipment.

We have unquestionably constructed a larger variety of successful types of petroleum refinery equipment than any other concern in this field, and the knowledge thus gained is invaluable.

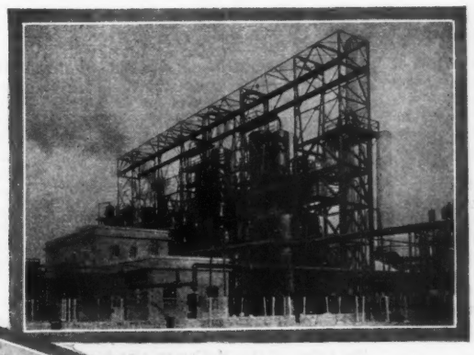
Various systems originated by us are accepted today as standards by the refining industry.

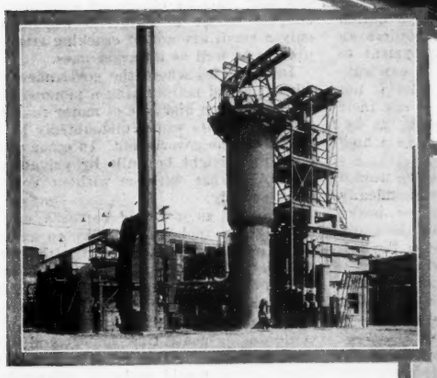
There is no substitute for experience, backed by an organization speciallizing in fractional distillation, and by thorough research.

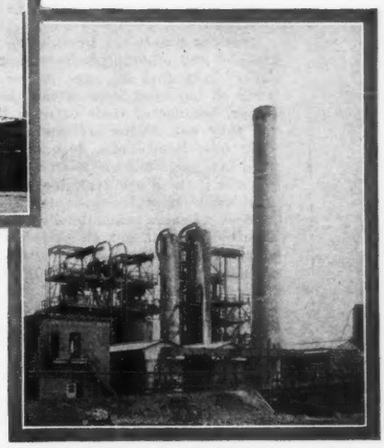


E. B. BADGER &

NEW YORK LOS ANGELES







The following Companies are some of those who have purchased BADGER Equipment:

The Texas Company
Tide Water Oil Co.
Sinclair Refining Co.
Anglo-Persian Oil Co. Ltd.
Emlenton Refining Co.
Shell Petroleum Corp.
Phillips Petroleum Co.
Standard Oil Co. of N. J.
Empire Oil & Refining Co.
Texas Pacific Coal & Oil Co.
Associated Oil Co.
Pennzoil Company
Independent Refining Co.
Gulf Refining Co.
Tidal Refining Co.
Continental Oil Co.
Anglo-Mexican Petroleum Co. Ltd.
Cities Service Refining Co.
Barnsdall Corporation
Beacon Oil Company
Pierce Petroleum Corp.
Magnolia Petroleum Co. of Texas
New Orleans Refining Co.
Skelly Oil Co.
General Petroleum Corp.
Shell Oil Company
Freedom Oil Works Co.
Vacuum Oil Company
Richfield Oil Co.
Humble Oil & Refining Co.

SONS COMPANY

TULSA HOUSTON BOSTON

Corrosion in Cracking Coil Tubes

Explain Results Obtained With 14 Cracking Units Operating With Charging Stock From Sour Crude

By Briand Mead, S. S. Shaffer and E. Camp
Development Department of Humble Oil & Refining Co.

In recent years the cracking of charge stocks derived from sour crudes has become more and more general since the discovery of large productive areas of such crudes, especially in Texas. With the increased sulphur content of these crudes, there has gone hand in hand an increase in the corrosive tendency of cracking conditions so that at the present time many stocks are being cracked which a year or so ago would have been considered much too corrosive to handle in such equipment.

Refiners, faced with the necessity of handling such corrosive stocks, have gone to two alternate methods of overcoming the excessive deterioration of equipment which their use entails when they are handling them without such precautions. Thus, we find many refiners using a chemical neutralizer which is either fed in with the charge stock to the cracking equipment or else is used in neutralizing those products which cause corrosion in the overhead and condensing equipment. (In this connection the reader is referred to a recent summary by Whitman and Roberts, reported at the 1929 Fall meeting of the A.P.I. at Chicago, and giving valuable data on the use of lime.) Other refiners have felt that more satisfactory results could be obtained by the use of corrosion resistant alloys in those parts of the equipment where corrosion is excessive. It is in order to describe the results which have been obtained by the use of the second method that this article has been written.

Results With Alloy Tubes

In fourteen cracking coil furnaces, alloy tubes have been substituted for carbon steel tubes throughout the furnaces where the temperature of the oil is above 700° F. Data previously reported (A.P.I. meeting December, 1927) had indicated that up to this temperature comparatively little corrosion was suffered by the tubes.

The alloy used was KA²S, made by the Central Alloy Steel Corp., and fabricated by Babcock & Wilcox Tube Co. This alloy contains approximately 18 per cent chromium and 8 per cent nickel. The tubes are rolled into the cast steel header boxes.

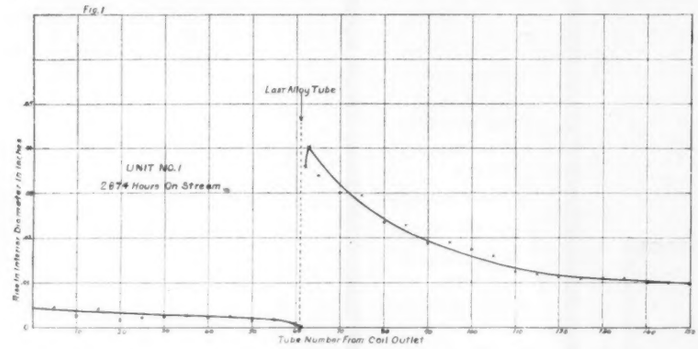
Measuring from the coil outlet, the first 61 tubes are made of KA²S metal. The tubes are placed in this particular section because of high temperature and corrosive conditions. Measurements are taken of the interior diameter of the tubes at regular intervals of from 2,000 to 4,000 hours. Long handled calipers are used to measure these diameters. Measurements are taken at distances 6, 18, 36, 60, 84 and 120 inches from the end of the tubes. From these measurements the average gain in interior diameters are obtained.

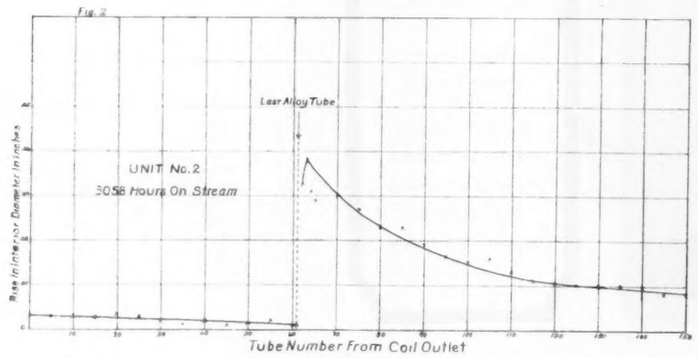
Corrosion Rates

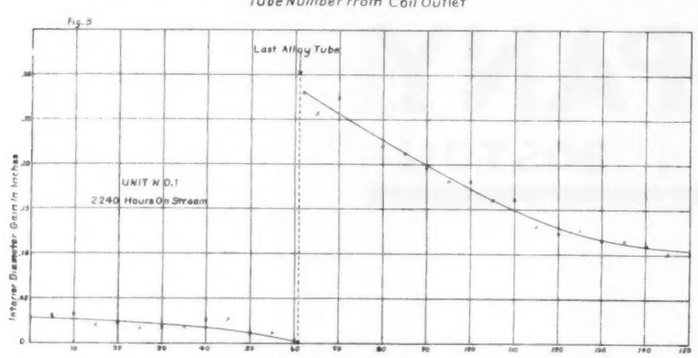
In Figure 1 are shown the corrosion rates in the tubes of the Ingleside Cracking Coil Unit No. 1. In Figure 2 a plot is given of the corrosion rates in the tubes of the Ingleside Cracking Coil Unit No. 2. Both units are operated on light West Texas gas oil. In Figure 3, a plot is given of the corrosion rates in the tubes of the McCamey Cracking Coil Unit No. 1. This unit was operated on West Texas gas oil. These data clearly indicate the effect of increasing temperature and cracking on tube corrosion. A good comparison is also given between the rates at which the KA²S and the regular carbon steel corrode. The KA²S tubes, which were placed under the most severe temperature and corrosive condition, show practically no gain in interior diameter in this corrosive service, whereas carbon steel tubes have frequently to be replaced.

Conclusions

The fourteen furnaces that have had KA²S tubes installed have continued operations without any trouble. This alloy gives promise of wider use for tubes in cracking equipment.







Charts showing performance of coils.

SUGGEST STORAGE OF CRACKING STOCK IN AREAS WITHOUT CRUDE

By Paul Truesdell
Universal Oil Products Co.

Development of the cracking process has now reached the stage where it offers to countries which have no natural deposits of petroleum the means to overcome the handicap under which nature has placed them and put themselves practically on an equal footing with countries beneath whose soil lie pools of crude oil.

By installing cracking plants a nation can establish within its own borders an industry which will give employment to many of its citizens and which can supply in normal times a large part if not all of the motor fuel required to run their cars, at the same time producing as by-products coke and gas which have a high fuel value.

Cracking plants can provide the needed gasoline and other products economically either from fuel oil, gas oil or heavy crude oil imported from outside the country or, because of their extreme flexibility, they can utilize as charging stock shale oils, lignite oils, bituminous tars, wood tars, peat oils and even vegetable or fish oils if these are available at home.

In most countries the chief source of cracked gasoline undoubtedly would be imported fuel oil, gas oil or crude petroleum. As refining processes are conducted today they usually result in the production of an excess amount of fuel oil which can be bought at low cost. Also, there is almost always available plenty of low grade crude, perhaps containing little or no natural gasoline, which nevertheless would give high yields of excellent motor fuel by cracking.

That the building up of a gasoline manufacturing industry is possible in countries which have no crude oil at home is shown by recent installations in European countries.

Foreign Installations

In Italy, two companies have recently installed cracking units and in Belgium a small plant has recently been started. The two Italian companies are the Societa Anonima Benzina Italiana of Naples and the Societa Per l'Industria Italiana del Petroleo of Spezia. The Belgian company is the Belgian Cracking Co. and its plant is at Langerbrugge.

The first named Italian company, called B.E.N.I.T. for short, has one unit which was fired up for the first time last September. It is operating on fuel imported from Russia. The plant in Spezia consists of two cracking units and is operating on fuel oil brought in from Rumania.

The Belgian plant, which went into operation only two months ago, also is using Rumanian fuel oil as charging stock, although it was designed to operate on tar from low temperature carbonization of coal. The Belgian plant is quite a novelty, having a capacity of only 300 bbls. of charging stock a day. In as much as the plant is reported to be making profits it would seem to demonstrate the fact that cracking plants are economically adapted to use in refineries which have only a small amount of cracking stock to process as well as in larger ones.

In countries where the government inclines toward maintaining a monopoly on the production and sale of motor fuel, the cracking plants would undoubtedly be installed by the government. In other countries they might be built by private enterprise, either with or without government subsidy.

Desirable as it would be for a nation to build up such an industry to employ its citizens and supply them with motor fuel in peace time, this might be considered as secondary to the great possibilities such a policy would offer as a measure of national defense. A country could during peace time import and store quantities of fuel oil or other charging stock which would make it independent of imports if shut off from its source of supply. It could, in fact, in favorable times build up man-made deposits of oil to provide motor fuel in time of stress.

Emergency Reserve

The last war demonstrated conclusively the enormous importance of adequate supplies of petroleum for a nation carrying on war. Even a country remaining neutral is likely to suffer partial or total paralysis of its automative equipment, both on the ground and in the air, if it was dependent on one of the belligerent nations for gasoline supplies or if imports from other neutral sources were cut off by blockade.

This phase of the possibilities of cracking was brought out forcefully by Dr. Gustav Egloff of the Universal Oil Products Co. in a paper presented before the World Power Conference in London in October, 1928.

The building up of a large stock of fuel oil would be perfectly feasible in any country, as Doctor Egloff pointed out.

For instance, he said: "A country the size of France, which consumes in the neighborhood of 400,000,000 gallons of gasoline per year could accumulate, over a period of time, 100,000,000 bbls. of fuel oil. This would furnish, by cracking, 50,000,000 bbls. or 2,100,000,000 gallons of gasoline, sufficient for 31,500,000,000 car

(Continued on Page 294)

Part by Part

the *inside* story of

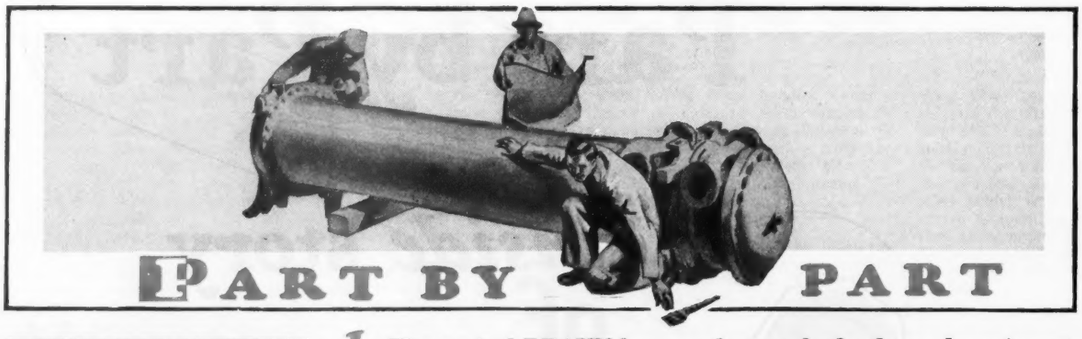
BRAUN EXCHANGERS

BRAUN Heat Exchangers, like other Braun products, are the result of exhaustive research ... not only in design but in manufacturing methods and in the choice of finest materials. All factors which may produce greater efficiency, greater ease of maintenance and longer life are considered. We present for your examination and analysis their distinctive features, part by part.

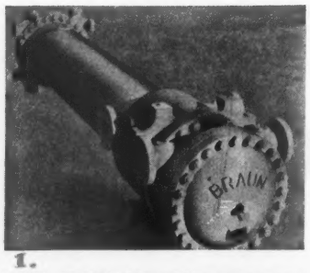
C·F·BRAUN & CO·LTD.

ALHAMBRA, CALIF. MAIN OFFICE

Branches: NEW YORK 120 Broadway · HOUSTON Neils Esperson Bldg. · SAN FRANCISCO Russ Building · TULSA Kennedy Bldg.

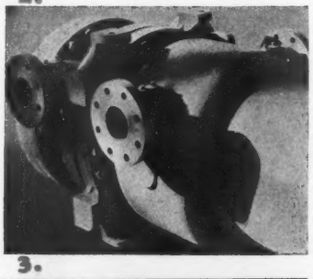


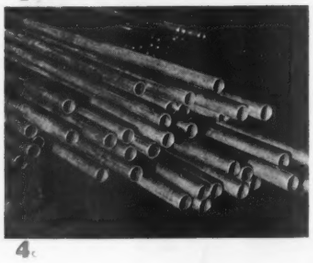
PART BY PART



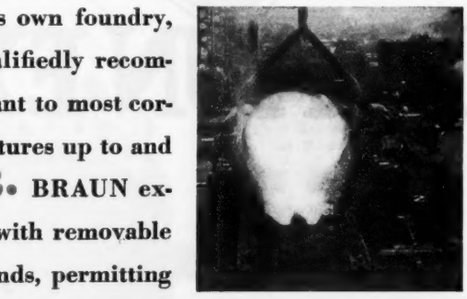
1.

2.


3.


4.

1. The typical BRAUN heat exchanger body shown here is cast of a special close grained, tough semi-steel. Developed and produced in the Company's own foundry, this material is unqualifiedly recommended as highly resistant to most corrosive fluids at temperatures up to and including 600° F. **2.** BRAUN exchangers are provided with removable bolted covers at both ends, permitting ready inspection, cleaning and replacement of tubes without breaking pipe connections. The bolts are large and rugged and are relatively few in number, eliminating the tedious, costly handling of large numbers of small bolts. **3.** The fluid connections are flanged nozzles, faced and drilled for through bolted connection to flanged pipe or fittings. No studded pads are used. The annular inlet chambers prevent direct impingement on tubes and distribute the flow to effectively utilize all the heat transfer surface. **4.** BRAUN exchangers are available with tubes in a large variety of materials, sizes and gauges. For most services a specially treated, seamless drawn Admiralty mixture, subject to rigorous and exacting chemical and

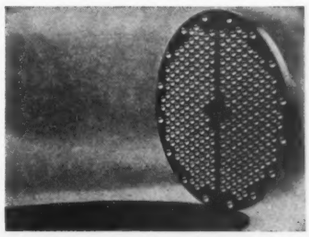


C·F·BRAUN & CO·LTD.

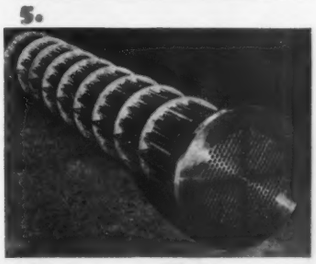
ALHAMBRA, CALIF. MAIN OFFICE

Branches: NEW YORK 120 Broadway · HOUSTON Neils Esperson Bldg. · SAN FRANCISCO Russ Building · TULSA Kennedy Bldg.

physical tests, is recommended. For special services involving high temperatures and/ or unusual corrosive influence other non-ferrous alloys, and various alloy steels are available. **5.** The tube sheets are machined from materials having physical properties suitable for the tubes expanded into them, and chemical properties best suited to corrosive conditions that may be present. They are of a thickness adequate to provide rigidity in addition to strength. Tube holes are pitched at distances providing adequate remaining metal; no sacrifice in strength or tightness of tube joints is made in order to increase the surface in a given size unit. **6.** The assembled tube bundle of every BRAUN exchanger is, as a unit, completely removable from the body for inspection, cleaning or servicing. The floating tube-sheet permits free expansion and contraction of tubes with changes in temperature. The BRAUN orifice type turbulence plates (patented) provide a maximum turbulence upon the tube surface with resultant high heat transfer rate at a minimum loss in fluid friction. **7.** The heavy machine bolts used in the assembly of BRAUN exchangers are of special high tensile carbon or alloy steel, threaded both ends, with cold-punched hexagon heads screwed on. They are machined from the solid bar in our own bolt machines and are subject to exacting requirements. Bolts with upset heads and hotpressed nuts are not used. **8.** The heavy and rigid supporting lugs or feet are integral with the body. They are conveniently placed to give adequate support without interfering with routine maintenance. They are faced and drilled *after* assembly of the unit, insuring perfect alignment with fittings when installed.

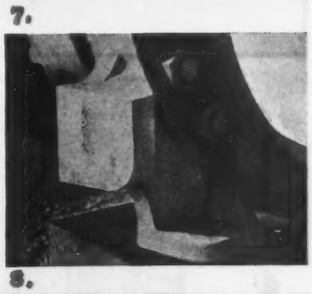


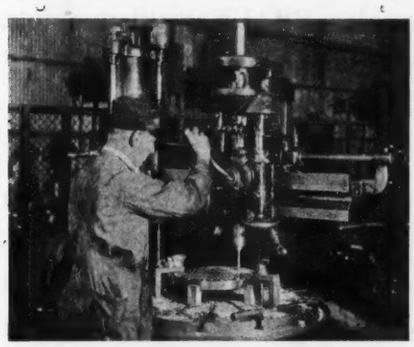
5.



6.

7.



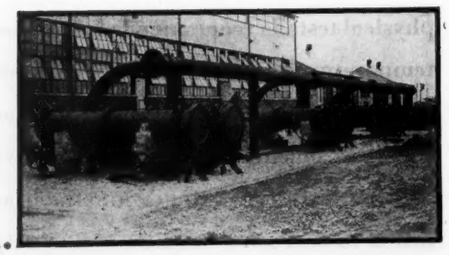


8.

C·F·BRAUN & CO·LTD.

ALHAMBRA, CALIF. MAIN OFFICE

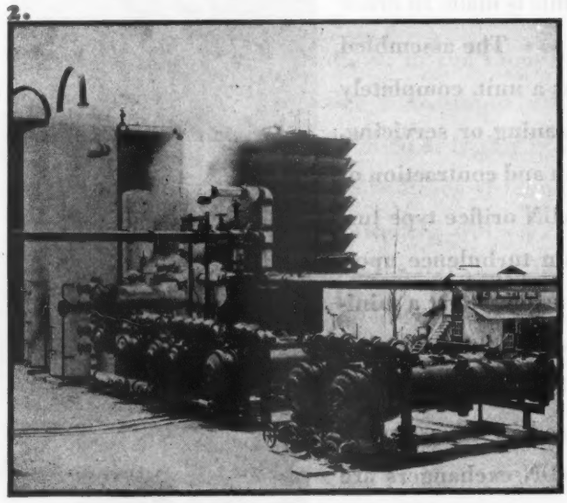
Branches: NEW YORK 120 Broadway · HOUSTON Neils Esperson Bldg. · SAN FRANCISCO Russ Building · TULSA Kennedy Bldg.

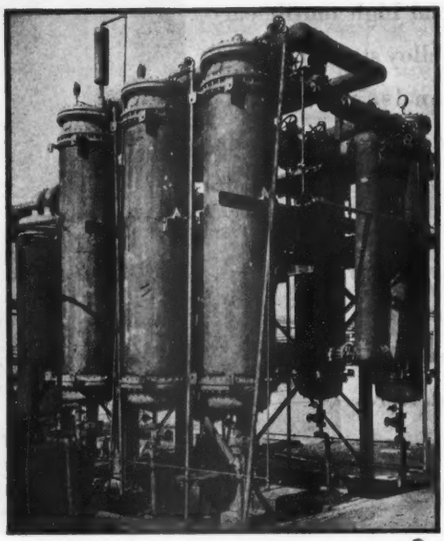


1.

PICTURES OF

2.





3.

1. Battery of large BRAUN gas coolers operating on a southern gas main at 350 lb. / in² gauge pressure.

2. Absorption oil heaters, heat exchangers and final coolers, in a complete BRAUN distillation unit. Gasoline capacity 30,000 gal. / 24 hr.

3. BRAUN asphalt to crude heat exchangers operating with extremely viscous fluids. Designed for temperature of 750° F. and 250 lb. / in² gauge pressure.

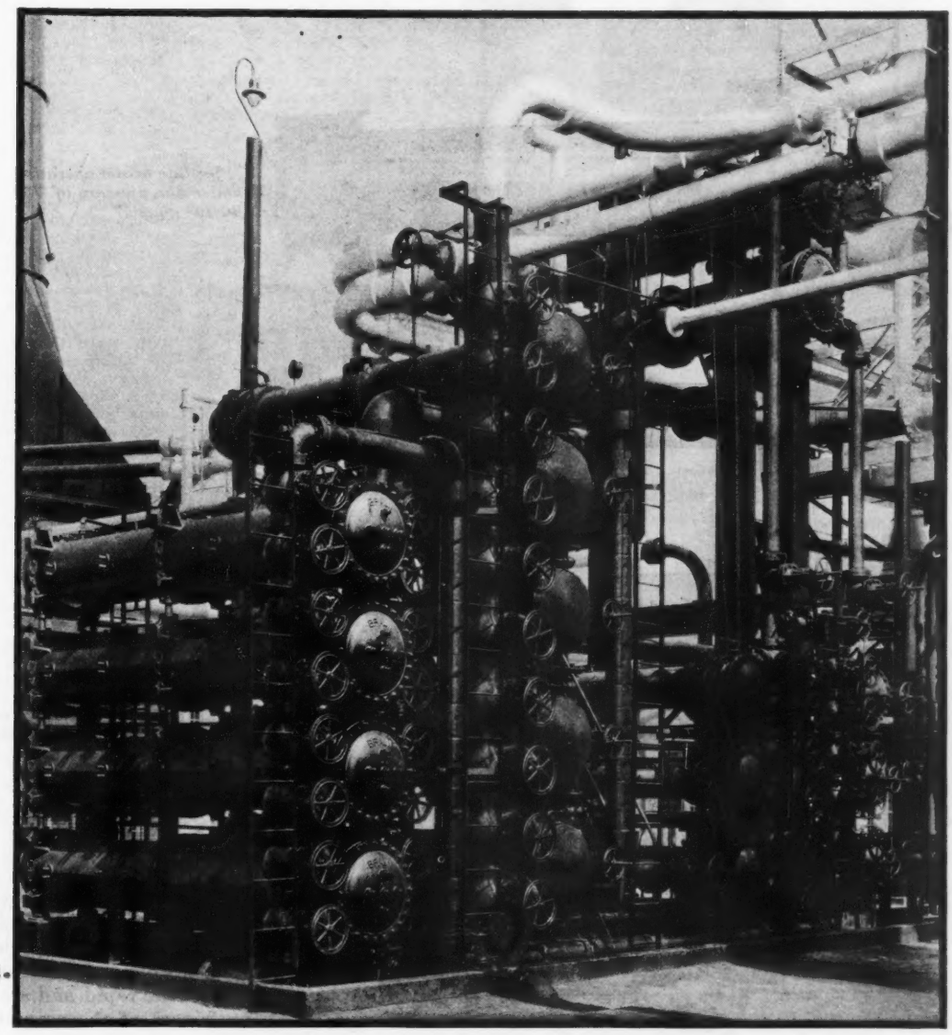
4. The complete heat exchange installation in an 18,000 Bbl. / 24 hr. refinery. The photograph shows the compact yet entirely accessible arrangement possible with BRAUN apparatus.

C · F · BRAUN & CO · LTD.

ALHAMBRA, CALIF. MAIN OFFICE

Branches: NEW YORK 120 Broadway · HOUSTON Neils Esperson Bldg. · SAN FRANCISCO Russ Building · TULSA Kennedy Bldg.

INSTALLATIONS

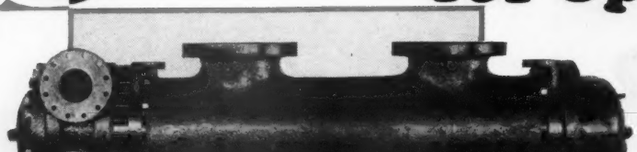


C·F·BRAUN & CO·LTD.

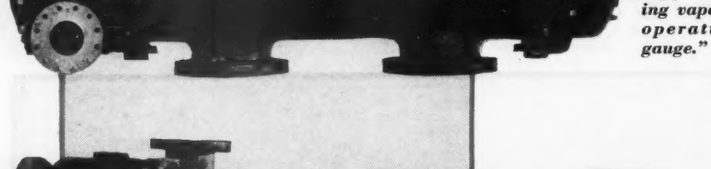
ALHAMBRA, CALIF. MAIN OFFICE

Branches: NEW YORK 120 Broadway · HOUSTON Neils Esperson Bldg. · SAN FRANCISCO Russ Building · TULSA Kennedy Bldg.

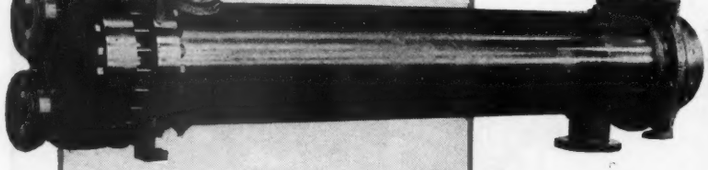
Special types for Special jobs



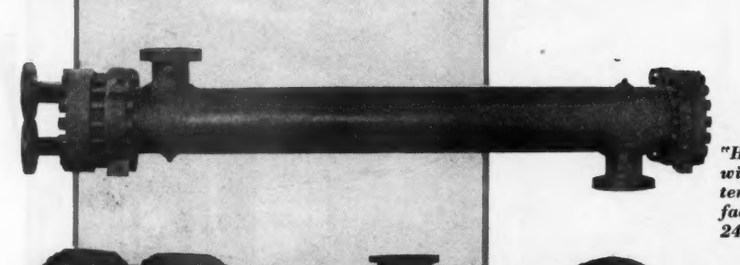
"Partial condenser for cracking plant cooling and condensing vapors from 900° F. and operating at 250 lb./in² gauge."



"Pipe-line heater operating under line pressure of 750 lb./in² gauge."



"Heat exchanger operating with propane at sub-zero temperatures. Subjected to factory hydrostatic test at 2400 lb./in² gauge."



"Evaporator condenser serving world's largest single shaft turbo-electric generator."

BRAUN heat exchangers are available in a large variety of standard types and sizes adapted to many services. For extreme conditions of high temperature, pressure, capacity or corrosion, the organization is prepared for the rapid and scientific design and manufacture of the correct apparatus.

C·F·BRAUN & CO·LTD.

ALHAMBRA, CALIF. MAIN OFFICE

Branches: NEW YORK 120 Broadway · HOUSTON Neils Esperson Bldg. · SAN FRANCISCO Russ Building · TULSA Kennedy Bld

Properties of Tomorrow's Gasoline

Should Continue Cheap, Vaporize Readily, Knock-Free and Contain a Large Amount of Energy

By T. A. Boyd
Research Laboratories, General Motors Corp.

There are two questions about tomorrow's gasoline that it would be nice to have the answers to. The first question is, "Will there be enough of it?" The second is, "What will it be like, or what will its properties be?" Only the second one of these two important questions will be discussed here; although, in passing, it may be said that there appears to be good reasons for believing that the answer to the first question is "Yes."

Besides being free from undesirable materials, such as gummy compounds and too much sulphur, there are four properties that an automobile fuel should have:

1. It should be cheap.
2. It should contain a large amount of energy.
3. It should be volatile enough to vaporize easily.
4. It should be knock-free.

These properties are such essential ones that it is but natural to suppose that tomorrow's gasoline will have to possess all of them, at least in some reasonable measure.

In respect to the first essential property of gasoline, that of cheapness, we have always been very fortunate. It is a familiar fact that neither the price of gasoline nor of the automobiles that use gasoline have gone up of recent years comparable to the cost of living in general. But measuring a thing by itself does not always make an adequate impression. So it may be worthwhile to compare the price that people pay for energy at the filling station with those that they pay for it at the grocery store, for instance. The man who buys bread pays about 10 times as much for energy as the man who buys gasoline. If automobiles had to be run on bread, the equivalent of a gallon of gasoline would cost over $2. In milk the energy equivalent of a gallon of gasoline costs about $7, which makes the late Senator La Follette's predicted $1 gasoline of a few years ago look quite cheap indeed. The energy equivalent of a gallon of gasoline in potatoes costs over $2.50; in butter it costs $5; and in eggs it costs more than $15. No wonder a hen does so much advertising after she has laid an egg. Eggs should be hard to sell. At a filling station they would be. And so it appears that the prices at which it has been possible to sell gasoline have been so favorable that it looks as though, if it should ever become necessary to do so, a little more per gallon could be paid for gasoline without really sacrificing the essential quality of cheapness.

Energy Content

In respect to the second essential property of gasoline, high content of energy, we have been very lucky in having gasolines made from petroleum. People sometimes talk about how wonderful it would be if racing cars could just run on some high explosive, such as nitroglycerin, or TNT, or dynamite. But the fact is that gasoline contains a great deal more available energy than any of these high explosives, to say nothing of being very much cheaper and safer. The relative amounts of energy in some of these materials are roughly in proportion to the following numbers, which give approximate heating values in B.t.u. per pound:

Gasoline	19,000
TNT	6,500
Nitroglycerin	3,200
Dynamite (No. 1)	2,500
Black powder	1,250

From these figures it is easy to see that it would not be any advantage to run an automobile race on dynamite, even if the engine could use it. Gasoline is much better.

The fact is that gun powder was the fuel used in what is thought to have been the very first internal combustion engine. Christian Huygens, a Dutch experimenter, has been credited with trying out that idea about the year 1860. But, for good reasons, his example was not followed in later and more successful engines.

It is because the "free air" sign at the filling station really means much more than it implies that gasoline is a cheaper and better fuel for automobiles than high explosives could possibly be. The explosive contains both a fuel and the oxygen necessary to burn it, and the oxygen had to be put into it at considerable trouble and expense, as well as at some hazard. But, in the case of gasoline, the customer buys only the fuel. All the air needed for burning it—and it takes as much as 100 pounds of air for each gallon of gasoline—he gets absolutely free.

In respect to this property of extremely high energy content, which characterizes the gasoline of today to such a remarkable degree, we could, if we had to, compromise a little in the case of the fuel of the future—at least we could so far as the motor car is concerned. The amount of power that a given engine yields is determined only to a minor degree by the heating value or the energy content of the fuel. Rather it depends primarily upon the amount of air that can be gotten into the engine's cylinders. The following figures, for instance, have been given by Tizard and Pye of England (Rep. Emp. Motor Fuels Com. 1923-24, p. 4):

Type of fuel—	Heat per unit volume of combustible mixture
Paraffin (hexane, heptane, octane)	20.07
Aromatic (toulene, benzene, xylene)	20.45
Naphthene (cyclohexane)	20.09
Alcohol (Ethyl Alcohol)	19.45

These figures show that the amount of heat available per unit volume of combustible mixture does not vary to any large extent as the composition of the fuel changes. Three per cent is the maximum variation in the values presented. And this is true in spite of the fact that the heats of combustion of the fuels, or their calorific values per pound, are widely different. Thus, the calorific value of the paraffins is about 19,000 B.t.u. per pound, whereas the calorific value of Ethyl alcohol is only 55 per cent of this figure, or 10,500 B.t.u. per pound.

The logical conclusion from these facts is that, if it should ever prove to be necessary, we could afford to compromise a little in the matter of the energy content of our fuel on the pound basis. This is a thing that we should not like to do however, and which we hope it will never be necessary to do. It would mean carrying around of more weight in the form of larger amounts of fuel. That would naturally be a decided handicap to aircraft, and then there are minimum ground clearances that have to be maintained on the fuel tanks of motor cars, too.

Volatility

It is for this reason that a liquid must be vaporized before it can be burned that a suitable degree of volatility becomes the third essential property of an automobile fuel. A portion of every liquid that makes a satisfactory automobile fuel must vaporize easily enough to make it possible to start an engine in cold weather, and all of it must vaporize readily enough to make the engine run smoothly after it gets under way.

It used to be that gasolines were not volatile enough. And so automobile en-

(Continued on Page 274)

Future Trends in Petroleum Research

More Attention to Be Paid to Special Products. Approaching Economic Limit in Modifying Existing Plants

By C. D. Dean
Imperial Oil, Ltd.

All industry since the close of the late world wide war has been characterized by research to a degree that had not prevailed from the introduction of the factory system up until that time. In the course of the elapsed decade the meaning of the word has undergone some change. Originally it had reference to protracted investigation undertaken with the idea of adding to the sum total of human knowledge to establish basic truths. Its present day meaning is considerably widened and embraces efficiency investigations as well as investigations undertaken with the idea of commercial exploitation on the principal object.

The petroleum industry by the very nature of petroleum has a myriad of problems that await the solution of the research workers and it is a patent fact to all who know anything of the industry that the research departments in the various units of the industry have grown to proportions that visibly stand out.

If one goes back to the situation in the latter days of the war, the outstanding feature was the scarcity of crude petroleum which necessitated almost the same drastic rationing on the part of the government as occurred with the food supply. Subsequent to the close of the war a price readjustment of all commodities occurred within one year that left the average price structure at a level 50 per cent higher than prevailed prior to the war. The subsidence of prices did not affect all industries in the same proportions.

The price readjustments that occurred within the units comprising one group were different from those that occurred among the other groups and the petroleum industry was one of the very few that suffered a readjustment to the prewar level. The situation in this industry therefore has been that what it buys now costs 50 per cent more, whereas it can obtain no more for its products than before this rise took place, an economic fact that has caused revolutionary changes within the industry, the end of which cannot be foreseen. The complexity of raw material combined with economic necessity caused the introduction of intensified and continually expanding research within the units of the petroleum industry that stands out so vividly among industrial research organizations.

There has not been equal application of research to the three main divisions—producing, manufacturing and marketing—and it is a matter of common observation that the problems of manufacturing have received the preponderant attention.

Research in Manufacturing

The basic operation in manufacturing is of course separations by the application of heat followed by chemical purification of greater or lesser complexity to meet specifications that fundamentally are set by the properties of crude petroleum available in the greatest profusion.

The research that has been applied in manufacturing has resulted in cheapening operations enormously by speeding up and modifying existing apparatus and substituting cheaper chemical processes which have been cheaper chiefly in reducing losses incident to chemical treatment. The striking feature of research of this kind is that practically all the independent entities within the industry are in about the same stage of development but what is not so patent is the fact that the development could only occur because of the enormously expanding volumes of petroleum consumed and the fact that the research was subordinated to speeding up existing apparatus on the few general classes of products in which the bulk of petroleum is consumed.

It is reasonable to suppose that we are approaching the economic limit for modifying existing plants and that not a great deal further can be expected in this direction so that the research departments will have to turn their attention to attacking more intensely problems in producing and marketing.

Production of Specialties

There is no present indication that the main products extracted from crude oil will be changed much in character from the consumer's standpoint no matter how much research is placed on it since they now serve very well their present uses. Subsequent research will likely go in the direction of producing specialties which will not necessarily be new uses but will more likely be for adaptation in some utilitarian direction that is now being satisfactorily supplied by materials from other sources. In any event, specialties will not have very wide application in so far as being a substantial proportion of crude oil consumption is concerned, so that whatever research is applied on these commodities should be borne by the commodities in question and not charged back into general plant overhead.

The point is worth stressing in view of the fact that while up to the present research has had considerable bearing on the plant operations which it undertook to correct, ground has been gained and it is unlikely that the same intensive effort continued on the same problem will yield results anywhere near commensurate with the results that have been obtained up to the present. For this reason research and research divisions should be subject to periodic review in order, on the one hand, to steer them in the direction that is going to give the best results from the standpoint of the petroleum industry, and on the other, to minimize the effect of carrying the expenditures as overhead by products which are receiving no improvement from research activities.

Sulphuric Acid Treatment Reviewed

Although Used for Many Years in Refining Petroleum Distillates the Mechanism of Its Action Is Not Yet Fully Understood

By L. C. Beard, Jr.
General Laboratories, Standard Oil Co. of New York.

Light petroleum distillates are treated with sulphuric acid in order to accomplish the following results:

Gasoline—Improved color, improved odor, lowered sulphur content, improved color stability, elimination of gum.

Kerosene—Improved color, improved odor, lowered sulphur content, improved color stability, improved burning characteristics: (a) Less incrustation of wick fiber, (b) decreased tendency to smoke in a lamp, (c) increased photometric value.

The intelligent application of sulphuric acid requires that it shall be so applied as to accomplish most economically the effects enumerated above.

The reaction of sulphuric acid with various classes of hydrocarbons and other compounds present in petroleum distillates is generally believed to be of the nature indicated below:

1. Paraffins and naphthenes are practically unattacked by either concentrated sulphuric acid or oleum, when treatment with these reagents is carried out at normal temperatures. At elevated temperatures, however, a certain amount of sulphonation and oxidation may occur.

2. Aromatic hydrocarbons, while practically unattacked by concentrated sulphuric acid at ordinary temperatures, are sulphonated by oleum or by concentrated acid at elevated temperatures with the production of sulphonic acids.

3. Unsaturated hydrocarbons are exceedingly reactive with sulphuric acid and undergo the following conversions: (a) The addition of sulphuric acid to the double bonds with the formation of neutral or acid esters of sulphuric acid. (b) Polymerization. (c) Addition of water, in the case of dilute acid, to form alcohols. (d) Oxidation.

4. Resinous and asphaltic substances are polymerized and also removed by the formation of unstable addition products with the sulphuric acid. Some evidence also points to their removal by adsorption in the sulphuric acid. Oxidation reactions also occur. The chemistry of the reaction of this class of compounds with sulphuric acid is exceedingly involved and far from clear.

Chemistry Exceedingly Involved

It is to be remembered that frequently polymeric compounds are produced as a result of the action of sulphuric acid on the olefines in a cracked distillate. These polymers, which are somewhat resinous in character, will be discussed later.

5. Sulphur compounds react in various ways with sulphuric acid, depending on the nature of the compound.

Mercaptans are oxidized to form alkyl disulphides, which are soluble in the treated oil and also to some extent in sulphuric acid.

Sulphides and disulphides are dissolved by sulphuric acid, the sulphates being more soluble than the disulphides.

Thiophenes are converted to thiophenesulphonic acid which is somewhat soluble in sulphuric acid.

Sulphoxides and sulphones are readily soluble in sulphuric acid.

In the treatment of light petroleum distillates with sulphuric acid, as has been indicated, the conditions of treatment control somewhat the nature of the results obtained. Important among these conditions of treatment are the following: Quantity of acid used, fraction addition of acid, concentration of acid, manner of mixing, time of contact, temperature, split treatment (treating the more volatile fractions very little or not at all and treating the heavier fractions more drastically), effect of method of settling or removing the acid sludge.

Quantity of Acid Used

The refining effect produced by the use of increasing amounts of sulphuric acid is not proportional to the amount of acid used. Small amounts of sulphuric acid serve to remove the more reactive products and additional amounts of acid become less effective as the products to be removed become less reactive.

Brooks has pointed out that in the treatment of cracked petroleum distillates the olefins react with sulphuric acid to form neutral or acid esters of sulphuric acid. The neutral esters are not removed by aqueous alkalies, and remain dissolved in the treated oil. The acid esters, however, are removed by aqueous alkalies. The larger the relative amount of sulphuric acid used, the smaller is the proportion of neutral esters which remain in the treated oil.

The greater the relative proportion of sulphuric acid used, the larger is the amount of polymerization of unsaturated constituents effected during the treating.

The use of a given quantity of acid in several successive treats is more effective than the use of the same amount of acid in a single treat. Since acid is always more effective when pure and uncontaminated with reaction products from treating operations, it is obvious that when acid is used in a series of successive additions better results will be obtained. This is especially true if the distillate to be treated contains water which might dilute the acid. The optimum way to utilize acid is to establish a counter current cycle in which acid sludge from previous treating operations is continuously used for treating fresh oil. Such a cycle will insure that the more refined oil meets the purest and most effective acid. Frequently only a two-stage cycle is used, acid sludge from a previous treating operation is used on fresh, untreated oil, and fresh acid is used on oil which has been previously treated with acid sludge.

Concentration of Acid

As a general rule the more concentrated the acid is, the greater is its reaction with the distillate being treated. However, it is desirable that the acid shall not react with the product being treated to a greater extent than is necessary in order to meet the trade requirements from the standpoint of quality. Concentrated sulphuric acid may not only remove the more reactive constituents such as the tar and resin forming diolefines and malodorous compounds, but may also react and polymerize or remove valuable unsaturated compounds of the olefine class. In addition to the possible loss of products sustained as a result of treatment with concentrated acid, the quality of the treated distillate is frequently impaired by the presence of polymers and esters formed during such treatment. Weaker sulphuric acid, on the other hand, frequently removes adequately the more reactive constituents without appreciably attacking the unsaturated compounds which are without harmful effect on the quality of the product.

It frequently happens that the color of naphtha, treated with concentrated acid, is worse than that treated with dilute acid. In a series of experiments on pressure still distillate, it was found that on treatment with acid, varying in concentration from 60 to 96 per cent H_2SO_4, that starting with 96 per cent acid, the color of the treated naphtha gradually improved as the strength of the acid decreased until at 80 per cent the best color was obtained; below 80 per cent the color of the treated product began to drop off. The gum (by evaporation in a copper dish) was also lowest for the naphtha treated with 80 per cent acid. In these experiments the naphtha was washed and sweetened prior to making the color and gum tests. Brooks recommends treatment with 85 to 90 per cent acid, followed by rerunning as an adequate treatment for most distillates.

Generally it can be said that the 66° B. acid which is widely used in the treatment of petroleum distillates, is concentrated enough for most purposes. Some economy might be effected in some cases in the treatment of naphtha by the use of a more dilute acid, depending on the character of the naphtha and the quality requirements of the finished gasoline.

The successful treatment of kerosene requires acid of at least 66° B. gravity and in some cases, particularly in the treatment of kerosenes high in aromatics, more concentrated acid or even oleum is used.

Manner of Mixing

Since, in the treatment of petroleum distillates with sulphuric acid we are dealing with two immiscible liquids, it is obvious that the more violent the agitation and the more intimate the mixture of acid and oil, the more effective will be the refining. Numerous patents have been granted for equipment and means for accomplishing this result.

Formerly air agitation was widely used for effecting the mixing of acid and oil, but today this method has largely been replaced by continuous treating in closed systems in which mechanical or orifice mixers are used.

The use of air agitation, in addition to the losses in product from evaporation and fire hazards involved, also causes a certain amount of oxidation, with an accompanying deterioration in the color of the treated product. Furthermore, if the air used contains a substantial proportion of moisture, this moisture is absorbed by the acid and dilutes it with the result that the efficiency of the acid is impaired.

This factor is related to the method of treating, the poorer the mixing of the acid and oil the longer the time of treating required in order to produce an adequate refining effect.

Even with the most intimate mixing the reaction between sulphuric acid and cracked distillates is by no means completed even after several hours. However, the desirable refining effects are usually obtained in the laboratory in about 20 minutes.

Inadequate time of treating will result in poor refining, while too long contact of acid and oil will result in increased sulphonation and polymerization with consequent loss and impairment of the treated product.

Increasing the Temperature

Increasing the temperature of treating increases the oxidation, polymerization and sulphonation of the treated oil. These effects result in poor color and a loss in product. Except in special cases, such as the treatment with oleum of certain illuminating oils high in aromatics, at elevated temperatures, in order to reduce their aromatic content, it is generally true that the best results are secured at low temperatures.

Halloran describes a method of treatment for cracked California gasoline in which the raw naphtha is chilled to a temperature of 5° below zero F. prior to treatment. During treating the temperature rises to 20°-25° F. This method of treating resulted in a reduction of over 40 per cent in acid consumption and lowered the treating and polymerization losses by 30 and 70 per cent respectively. In addition to these features it was found that strong sulphuric acid at low temperatures was an excellent solvent for sulphur compounds. The sludge produced was fluid in nature and there was an absence of acid reaction products in the treated naphtha. After treatment, the naphtha is neutralized and rerun for test gasoline using fire and steam.

As is well known the more volatile fractions of a straightrun or cracked naphtha are freer of colored and sulphur compounds and gum-forming constituents than are the less volatile portions. Sometimes, therefore, it has been found desirable to separate the naphtha by fractional condensation or other means into a light and a heavy fraction. The light fraction is sweetened or only very lightly treated, while the heavier portion is given a more drastic treatment. After treatment the heavier portion is rerun and combined with the lighter portion. In this manner treating losses and acid consumption can be materially reduced. Of course, if the lighter portion contains cracked material, and is given any treatment at all, it will be necessary to recombine it with the treated heavier portion prior to rerunning. It is obvious of course that this general idea is capable of application in a variety of ways.

Settling and Removal of Acid Sludge

Since the acid sludge contains the impurities that were originally present in the untreated naphtha, together with the reaction products of the oil and acid, it is a matter of prime importance that this sludge be completely removed prior to washing with water or soda.

As a rule, settling by gravity has been found to adequately accomplish this re-

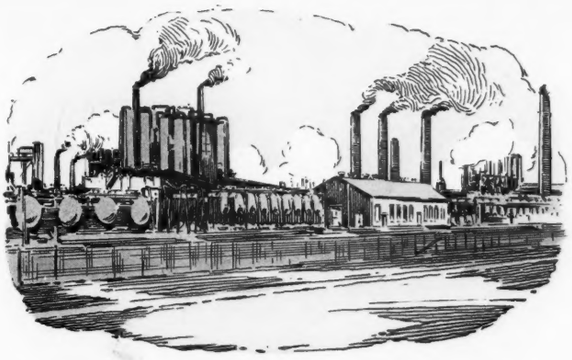
(Continued on Page 276)

USED IT IN REFINING "COAL OIL"

The use of sulphuric acid in the treatment of petroleum distillates dates from the very beginning of the industry. Sixty years before the Drake well was drilled, sulphuric acid was used by Tower in the British Isles for refining "coal oil".

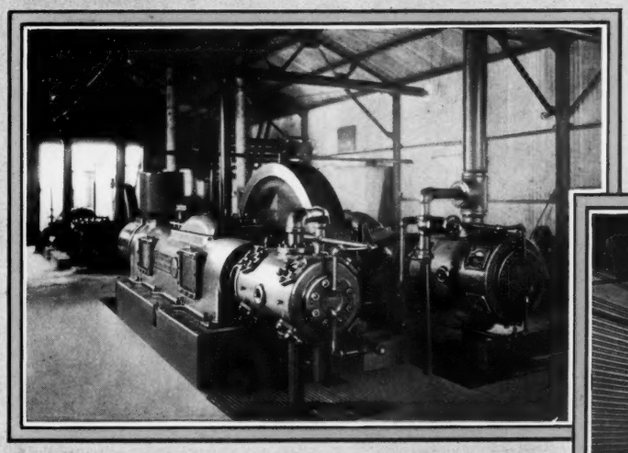
About the time of the completion of the Drake well in 1859, there were 53 refineries in the United States processing "coal oil". When petroleum became available, the methods of treating and refining developed for "coal oil" were adapted to the new product and amongst these methods was the use of sulphuric acid. Since that time numerous substitutes for sulphuric acid have been suggested and used, but today sulphuric acid still remains the most widely used and the most generally satisfactory treating agent for petroleum distillates.

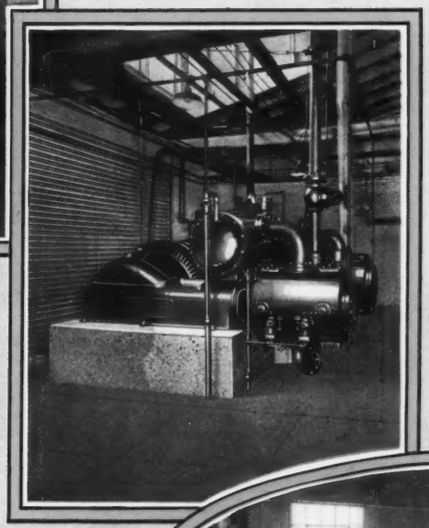
In spite of the length of time that sulphuric acid has been used in the refining of petroleum distillates, the mechanism of its action is as yet not fully understood, and the optimum method of applying the acid is not always used. It is the purpose of this paper to present in a general way the effect of different methods of application on the results obtained.



Modern Equipment for the Refinery

Compressors, Vacuum Pumps, Cameron Pumps





The illustrations show:

Top, Type XG Gas-Engine-Driven Compressor; *Center,* Type XRE Synchronous - Motor - Driven Compressor; *Bottom,* Cameron Centrifugal Pumps for handling water and oil.

INGERSOLL-RAND offers you compressors for every refinery application, and gives you the choice of any type of drive you prefer. Suitable machines may be had for any operating pressures and for handling any kind of gas. Our line of vacuum pumps is equally complete.

Cameron Pumps are available in types designed especially for every refinery service from boiler feeding to handling hot oil.

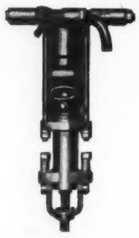
INGERSOLL-RAND COMPANY - 11 BROADWAY - NEW YORK CITY

Branch offices or distributors in principal cities the world over

ATLANTA	CHICAGO	DULUTH	KNOXVILLE	NEW YORK	SALT LAKE CITY	ST. LOUIS
BIRMINGHAM	CLEVELAND	EL PASO	LOS ANGELES	PHILADELPHIA	SAN FRANCISCO	ST. PAUL
BOSTON	DALLAS	HARTFORD	MANILA	PICHER	SCRANTON	TULSA
BUFFALO	DENVER	HONOLULU	NEWARK	PITTSBURGH	SEATTLE	WASHINGTON
BUTTE	DETROIT	HOUSTON	NEW ORLEANS	POTTSVILLE		

CC-35 Concrete Breaker

Size CC Drill



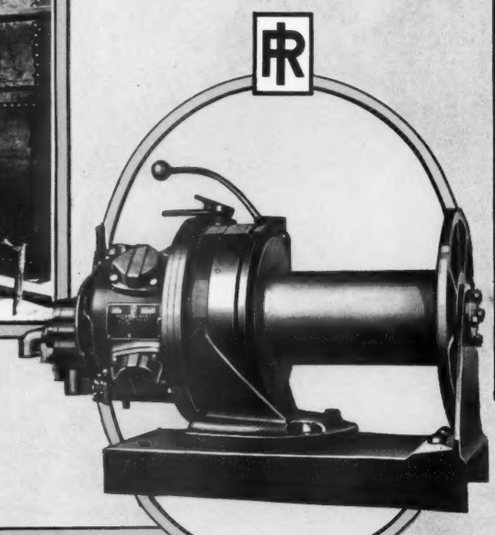
R-39 Jackhamer

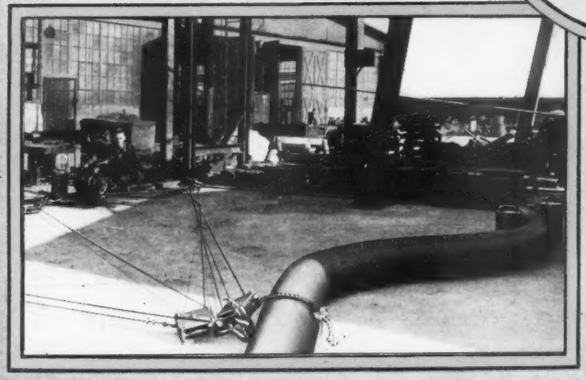
Size 8-A Riveting Hammer

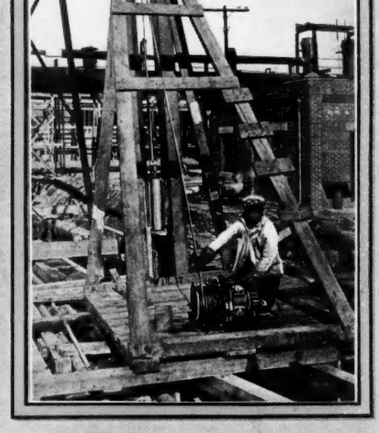
Safety First Air Saw

Size 73 Clay Digger

Air-Driven Tools will do it Quicker







The "Utility" Hoist

This powerful hoist lives up to its name around refineries. It is shown above handling tank plates and moving a tank car. At the left, it is bending a 16-inch pipe. At the right, it is driving sheet piling. This is a portable hoist, available in 6 sizes. It can be furnished with a winch head, or with an outboard bearing, as above.

Ingersoll-Rand

Much to Master in Chemistry of Oil

Development of Petroleum Research Hindered by Incomplete Knowledge of Pure Chemistry of Aliphatic Hydrocarbons

By Alfred W. Nash
Professor of Petroleum Technology, Department of Oil Engineering and Refining, University of Birmingham, England.

It has been known for some time that the gaseous paraffins, ethane, propane, butane and higher homologues, when cracked by passage through hot tubes, yielded, among decomposition products, tars from which light aromatic spirits could be recovered. Until recently methane was not considered to be amenable to such a reaction whereby aromatic spirits could be produced, and it was considered that its decomposition products on thermal treatment were carbon and hydrogen only. It has now been shown, however, that if this gas is passed through sufficiently heated tubes, in the absence of certain catalysts such as iron, and at a high velocity of limited range, tarry products can be formed. The yield of tars is, however, not so high as that obtained from its higher homologues in, for example, a wet gas.

This is of great significance to the petroleum industry and means that by a comparatively simple cracking operation natural gas can be made to yield important quantities of a high antiknock spirit, wet gas being capable of higher production than dry gas for the reason mentioned already.

Experiments Exemplify Process

The large scale experiments carried out by the Anglo-Persian Oil Co., Ltd., which exemplify this process, are stated to have given 220 gallons of benzol per 1,000,000 feet of gas containing about 80 per cent methane and the remainder largely ethane, while a gas consisting of 36 per cent methane and the remainder mainly ethane, propane, butane and pentane, gave a yield of 770 gallons of benzol for the same volume of gas. It was not stated to what extent methane contributed to the yields but it appears probable that the higher homologues were largely responsible for these results.

Methane, as already explained, needs more specialized conditions of gas velocity and temperature for cracking to optimum yields of tar. These conditions have been worked out on a laboratory scale and are essentially heating periods of about 0.6 seconds at temperatures of 1,150° C. in the presence of comparatively inactive materials such as porcelain or silica. Typical experimental products of the reaction are light oil 4.8 per cent., heavy tar 6.2 per cent, by weight; while the gaseous products included 2.21 per cent acetylene and 1.25 per cent ethylene, also by weight. Including the latter gases the conversion of methane to valuable products was raised to 20 per cent in our experiments and the light oil yield worked out on a larger basis was of the order of 200 gallons of benzol per 1,000,000 feet of pure methane.

Electrical Decomposition of Methane

The electrical decomposition of methane is a good example of a reaction worthy of notice of any petroleum concern with surplus supplies of dry gas. The main product of this reaction appears to be almost always acetylene which is an important substance from the point of view of the ease of its conversion to acetaldehyde, ethyl alcohol, acetic acid or even the polymerization to benzene. A recent series of experiments carried out by Stanley in this department, is demonstrative of this reaction. On decomposition of methane at atmospheric pressure by means of a spark discharge, acetylene and hydrogen were the chief gaseous products while smaller quantities of ethylene were also noted. Small quantities of liquid and solid hydrocarbons were also formed but these were highly unsaturated in character and in the case of the liquids resinfied rapidly. An interesting feature of the electrical decomposition of methane was, however, the formation of carbon in a finely divided flocculent form, the conversion to this substance being as high as 20 per cent.

The electrical decomposition of methane is a reaction that can be modified in many ways, for example if methane-nitrogen mixtures are used then hydrocyanic acid is among the reaction products. Such reactions may ultimately be shown to have localized interest, for instance a gold mining industry with its demand for cyanides might obtain the latter by such a reaction from a neighboring plant or field where excess methane is produced.

Other Lines of Attack

The thermal and electrical decomposition of methane are only two modes of attack on the conversion of this gas to produce chemicals of industrial importance. Other lines of attack include oxidation and chlorination. In the latter case a recent advance in our knowledge of the chemistry of methane has been made where a catalytic chlorination process is described that produces high yield of methyl chloride. With regard to oxidation, the importance of ready methods for the production of alcohols, aldehydes, etc., especially from the lower gaseous paraffins, will be obvious at once. There is, however, an additional possibility which has received some attention recently, namely the partial oxidation of such natural gas constituents as propane and butane where controlled conditions cause these gases to lose hydrogen with the formation of propylene and butylene respectively.

Enough has been said to indicate the work that has been carried out and the lines upon which future research can proceed in the case of methane, and the same remark can be taken to apply also for its higher homologues ethane, propane and butane.

Alfred W. Nash

EVEN SIMPLE SUBSTANCES INVOLVED

The development of petroleum research has long been hindered by the incomplete state of knowledge of the pure chemistry of aliphatic hydrocarbons. This lamentable ignorance can, in fact, be said to extend to the chemistry of such simple substances as the oxides of carbon.

As an example of this carbon monoxide may be quoted. From this gas the production of alcohols such as methanol by pressure catalytic hydrogenation was a reaction undreamed of only a few years ago.

The case of methane provides a further example where recent chemical investigation has opened up new avenues of commercial possibilities, and this gas is of special importance to those in the industry having surplus dry gas for disposal.

Antiknock Value of Pure Hydrocarbons

The investigation of the hydrocarbons present in gasoline is another fruitful field of research which is a further example of work impeded by the lack of pure chemical knowledge. The number of known hydrocarbons of the paraffin series in heavier gasoline is surprisingly few. Much valuable work has been carried out recently upon the preparation of hydrocarbons which are suspected or proved to exist in gasolines, and the investigation of their properties. Perhaps one of the most interesting of these researches has been upon the relative antiknock values of pure hydrocarbons.

A number of octanes were first examined and a great difference in the antiknock value of the straight chain and branched chain isomers noted. One iso-octane (2.4.4. trimethyl pentane) was found to have high antiknock qualities comparable with those of benzol. Another investigation using pure heptane, methylcyclohexane, hexylene and toluene proved the naphthene and olefin in question to be half as effective as toluene in suppressing knock.

A recent series of experiments carried out by Howes in this department upon a larger series of hydrocarbons gave additional interesting results. In this case the hydrocarbons were made up as 20 per cent mixtures by volume in a standard gasoline and matched in a Delco testing unit against the same gasoline doped with ethyl fluid. Their relative value as antiknocks is summarized in the following table where the hydrocarbons are tabulated in order of merit.

TABLE 1—RELATIVE ANTIKNOCK VALUE OF SOME PURE HYDROCARBONS

(In order of merit)

Naphthenes	Aromatics	Unsaturated hydrocarbons.
		Diisobutylene
		Diamylene (a)
		Trimethylethylene
	p-Cymene	
	p-Xylene	
	m-Xylene	
	p-tert-Butyltoluene	
	Ethylbenzene	
		Diamylene (c)
		Diamylene (b)
		Pentene-2
	tert-Amylbenzene	
	tert-Butylbenzene	
	o-Xylene	
	Toluene	
	Iso-Propylbenzene	
		Cyclohexane
	Benzene	
	sec-Butylbenzene	
Cyclohexane		

The conclusions from this table are of profound interest and may be formulated as follows:

1. Hydrocarbons of the same series, e.g. aromatic or unsaturated, have widely different antiknock value.

2. Some of the unsaturated hydrocarbons have a greater antiknock value than aromatics e.g. diisobutylene, diamylene and trimethylethylene.

3. Different samples of a complex hydrocarbon such as diamylene, which is undoubtedly a mixture of isomers, have different antiknock value.

The samples referred to above as diamylenes (a), (b), and (c), were prepared as follows:

Diamylene (a) by the polymerization of trimethylethylene with concentrated sulphuric acid at 0° C., boiling point 150-156° C.

Diamylene (b), a fractionated sample from Sharples Solvent Corp. product; boiling point 150-154.5° C.

Diamylene (c), from same source, boiling point 154.5-159° C.

Aromatic Series Interesting

The aromatic series included in the above table also presents features of interest. Toluene has a better antiknock value than benzene and the xylenes are more effective than toluene. In the case of the xylenes, p-xylene was found to be the most effective and o-xylene the least. The significance of side chains in aromatic hydrocarbons is also apparent. Pure substituted benzenes are the best antiknocks e.g. p-cymene, p-xylene and p-tert-butyltoluene. Tertiary groupings appear to have a better effect than secondary groups, for example, tert-butylbenzene is more effective than sec-butylbenzene in knock suppression. The latter hydrocarbon has a lower effect than benzene.

This interesting comparison of the engine behavior of pure hydrocarbons is of the greatest value in the preparation and evaluation of motor fuels. The result has led to the investigation of the relative oxidation tendencies of many of these hydrocarbons and to the discovery of a relation between the ease of oxidation and antiknock value in the case of octanes. Further experiments on this line may show important and valuable relationships with other hydrocarbon series.

Other Fields of Research

The antiknock value of pure hydrocarbons that are known to be present in gasoline is but one field of research, others include the oxidation and gum formation of hydrocarbons especially those in cracked gasolines. The discovery of inhibitors to oxidation of gasolines is an example of a research that will find immediate industrial utility.

Before dismissing the subject of the isolation and identification of the chemical constituents of gasoline, the work on Burmah and other crudes show how

(Continued on Page 263)

The Dubbs Cracking Process can not only make excellent gasoline from refinery waste products at very low cost, but its operation can be regulated so as to make by-products that find a ready and profitable sale in the market in which the plant is located

Dubbs units can make fuel oil meeting all market specifications in localities where

coke is not in demand, or they can run to coke, making no liquid residuum whatever

They can be fitted to the needs of any refiner anywhere

Universal Oil Products Co
Chicago, Illinois

Dubbs Cracking Process
Owner and Licensor

Processing Panhandle, Texas Crudes

Macmillan Plant Incorporates Unique Features Designed to Solve Special Manufacturing Problems. Describe Installation

By C. C. Benz
Assistant Manager Manufacturing, Macmillan Petroleum Corp.

Located at Borger, Tex., the Macmillan Petroleum Corp. has a 6,500-bbl. refinery running practically 100 per cent sour Panhandle crude. The various processes employed in handling this crude oil no doubt will be of interest to the refining fraternity.

The crude oil used in this plant averages about 38° gravity, congeals at 58° F., has as high as 500 grams of salt (sodium chloride) per barrel, with more than traces of hydrogen sulphide, magnesium chloride, colloidal shale and iron sulphide from the various production and pipe line equipment used for transportation.

The crude oil is charged by centrifugal pumps into exchangers, "K," sufficiently to impart a temperature of 200 degrees to the oil, from where it goes into washers, "AA." There are two of these water washers in series, the oil flowing upward in each through screens. At the same time water of 200° F. is passed counter-flow and downward against the oil. It has been found necessary to use fresh water for this purpose as recirculation does not clean the oil of water soluble salts as readily as the fresh water. Care must be exercised in the construction and operation of these towers to guard against emulsification.

The oil passes from these water washers into a settling drum, "B," which removes the larger part of such suspended moisture that is carried over from the water washers from the oil. The oil then passes under pressure into a centrifugal booster pump, discharging into a 4-inch tube still, "L," where it is heated to 300° F. This pump is used in this location so that the crude water washers and settling drum need not carry the back pressure of the retort, "L." Sufficient pressure is carried against the suction of this pump to prevent the oil and water from vaporizing.

It was found necessary to wash the oil before entry into this retort as it would plug up within 18 to 24 hours unless high velocities are employed in combination with this previous washing.

The oil passes from this retort into an evaporator, "C." This evaporator has ring and doughnut plates which are not seriously affected by the large amount of solids carried in the oil. It is also provided with a suction outlet on the side of the tower, the bottom acting as a catch basin for the solids. A small amount of steam is used for flashing the oil to facilitate pumping. The vapors from the evaporator pass to a direct contact heater, "D," where hot fuel oil flows down in a plate tower counter-current to the rising vapors from the evaporator. The disposal of these super heated vapors will be mentioned later.

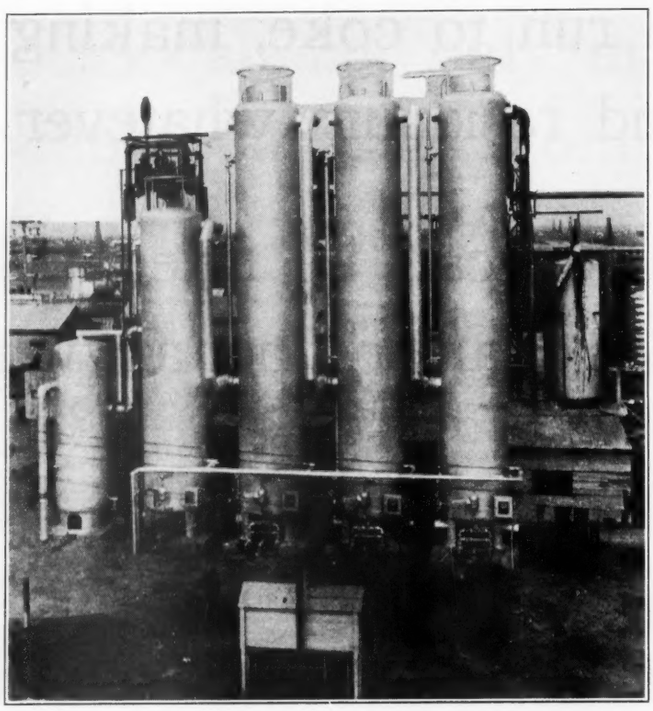
Dehydrating Crude

It was found necessary to dehydrate the crude in the evaporator prior to its passage through the hotter zone of exchangers, "K." Without this dehydration the exchangers would become plugged in from one to three days. The trouble has not been completely eliminated by dehydration so the crude passing through exchanger "K" flows around the tubes. As long as circulation is maintained the deposits of salts are exposed to steam and water washings. When the oil was passed through the tubes a large majority of the tubes would be completely stopped up, making the salt impossible to remove except by drilling. Two sets of exchangers are employed for this service so that one set may be in use while the others are being washed out. (Note—flow diagram in error.)

The oil from the side of the evaporator is pumped by centrifugal pumps into another 4-inch retort, "N," where it is heated to 525° F. Due to the corrosiveness and wax content of this oil it has been found impractical to run at a higher temperature. The oil from the retort passes into what is termed a salt settling tower, "F." This tower is 5 feet in diameter and 16 feet high and of sufficient strength to withstand the full pump pressure. The oil enters tangentially above a baffle set 10 feet from the bottom. This baffle is semicircle at the top and extends vertically downward for 6 feet. The vapors liberated pass upward through a ring and doughnut plate and out of the top, the oil passing downward at one side of the baffle and returning upward on the opposite side, dropping out solids which are removed through a blowdown. This blowdown is fitted with a manually operated stirrer to break up the sediment and allow the removal of same.

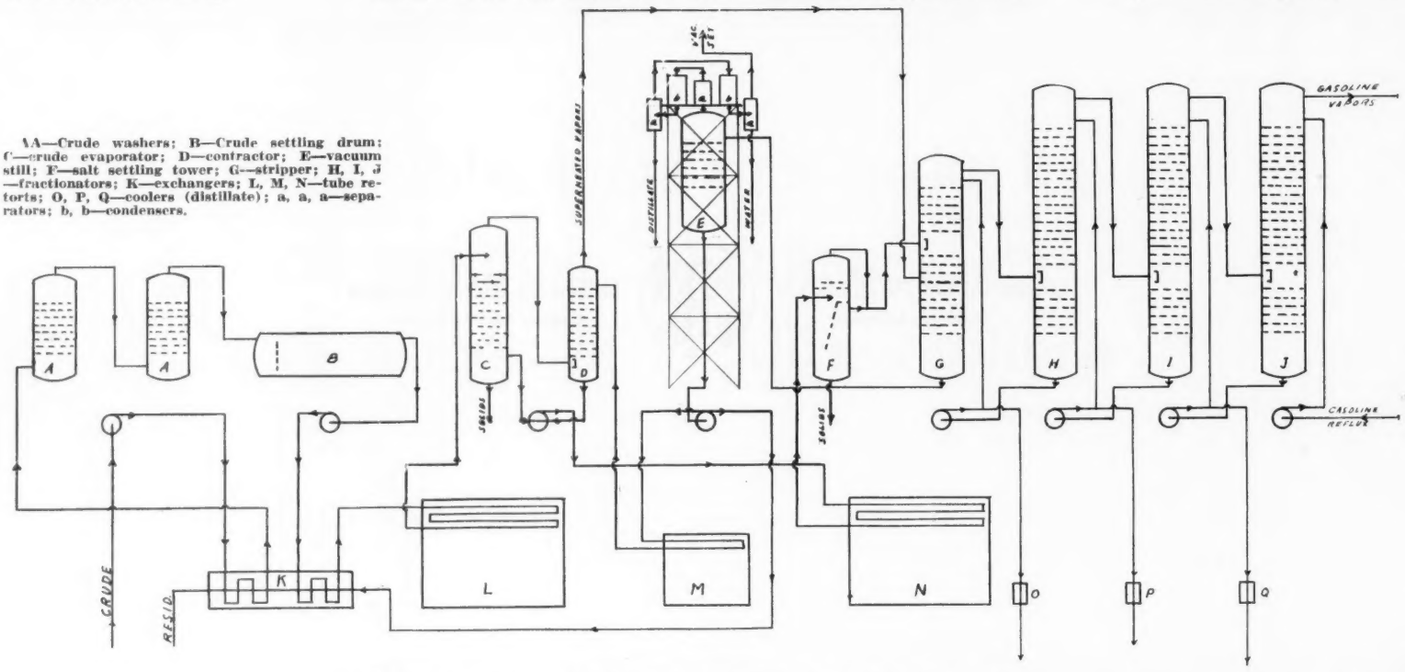
The oil leaves the tower just under the semicircular baffle and is joined at that level by the vapors from the top, this arrangement automatically holding the fluid level within the tower. The oil and vapors leaving the salt settler, "F," pass into the fractionating equipment proper at 500° F. This fractionating equipment is composed of four 72-inch

(Continued on Page 263)



Recently installed Bower-Sheldon process towers at Macmillan's Borger, Tex., refinery.

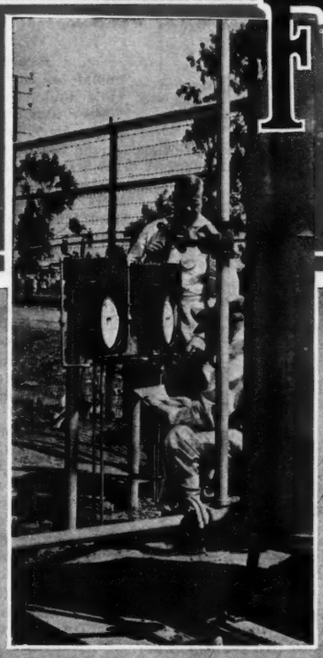
AA—Crude washers; B—Crude settling drum; C—crude evaporator; D—contractor; E—vacuum still; F—salt settling tower; G—stripper; H, I, J—fractionators; K—exchangers; L, M, N—tube retorts; O, P, Q—coolers (distillate); a, a, a—separators; b, b—condensers.

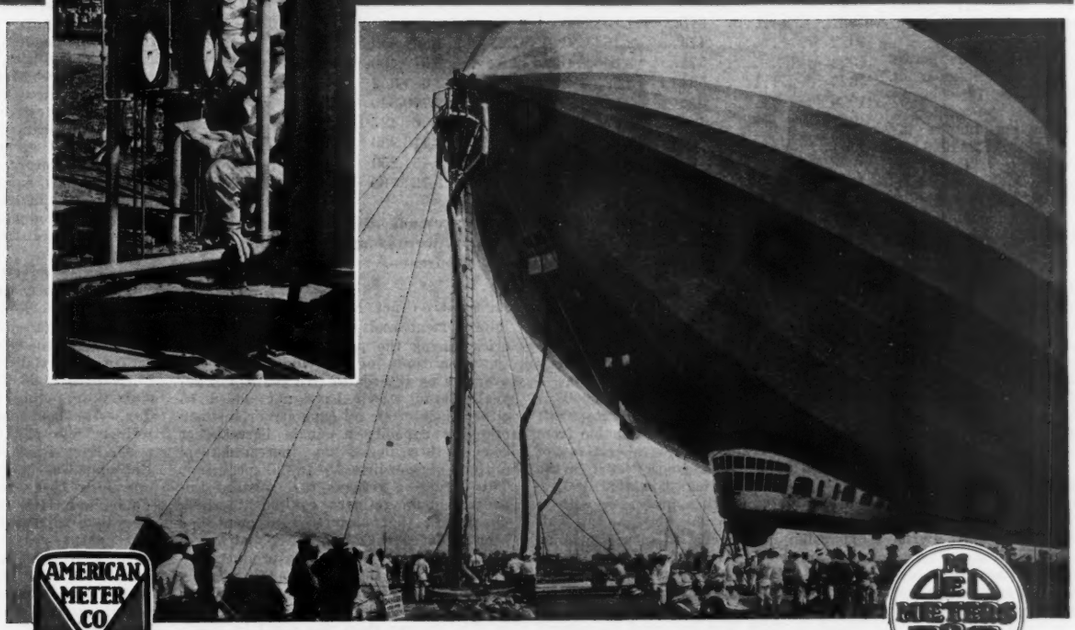


Flow chart showing operation of Borger, Tex., refinery of the Macmillan Petroleum Corp.

FUEL FOR THE GLOBE-CIRCLING GRAF-ZEPPELIN

must be proportioned and measured with great accuracy





AMERICAN METER CO — MEASUREMENT ENGINEERS — CUBIC FEET

Large photo above shows Graf Zeppelin taking on gas fuel at Los Angeles during round-the-world flight . . . Inset shows Westcott Orifice Meters used to insure accurate mixture of 36% natural gas and 64% Pyrofax.

ON her recent spectacular flight around the world, the Graf Zeppelin used gas fuel in her engines. Approximately 175,000 cubic feet of gas were taken aboard at Los Angeles, where refueling required about 12 hours. Throughout this period it was necessary to mix absolutely accurate proportions of natural gas and Pyrofax. Two 50-inch Westcott Orifice Meters were used to secure the exact control required.

Two Westcott Orifice Meters were used in a similar set-up for refueling at Tokio. This, the dramatic world-flight, furnishes further evidence of the part played by the products of American Meter Company in the industrial and technical achievements of the day.

WHEREVER ACCURACY IS ESSENTIAL, USE

METRIC orifice METERS

METRIC METAL WORKS
ERIE, PENNSYLVANIA
IRONCASE, TINNED STEEL CASE and ORIFICE METERS

AMERICAN METER COMPANY
INCORPORATED
The World's Largest Manufacturers of Gas Meters and Allied Apparatus
ESTABLISHED 1836

Sales Service:

Capacity Nears Four Million Daily

Annual Survey Shows Refiners in United States Continue to Expand All Phases of Plant Operations.

By C. O. Willson

Plant facilities in the United States for the manufacture of finished products from crude oil are rapidly approaching the point where 4,000,000 bbls. of raw material could be refined daily.

The Oil and Gas Journal's annual survey of the industry giving the capacities of the individual refineries shows that on March 1 there were 479 plants with a rated daily crude oil capacity of 3,972,460 bbls. Of this number, 362 plants were operating with a capacity of 3,721,360 bbls. daily, and 117 plants having a total capacity of 251,100 bbls. daily were shut down.

Compared to a year ago this is an increase of 16 in the total number of plants and a gain of 252,910 bbls. in the daily rated capacity of the refineries. The number of operating plants increased from 341 on March 1, 1929, to 362 on March 1 of this year. The crude oil capacity of these operating refineries increased 267,110 bbls. daily. A few shutdown plants have been dismantled so that the 117 listed in this year's survey is 5 less than was shown in the report of last year with a decrease of 14,100 bbls. in daily rated capacity.

Sufficient Capacity

It is apparent that the oil industry need not fear a shortage in manufacturing facilities through 1930. It is estimated that 2,700,000 bbls. of crude oil refined daily in the United States will furnish all the petroleum products needed in 1930 for domestic demand and exports. Considering only the operating refineries this mean an excess refining capacity totaling 1,000,000 bbls.

In this connection it is well to keep in mind that comparative figures on crude oil capacities only tell part of the story in refinery growth. From its early history the oil business has been accustomed to measure its refining operations in terms of barrels of crude oil and this practice still prevails in the industry generally. Those actually engaged in the various phases of refinery operation, however, are rating their plants on a basis of output of finished products rather than throughput of raw material.

RECAPITULATION

TABLE 1—GROWTH IN PETROLEUM REFINING (1914-1930)

Year—	Total number of refineries	Total crude capacity bbls. daily	Number of operating refineries	Capacity operating refineries bbls. daily	Number refineries with cracking process*	Cracking capacities bbls. daily
1914	176	.....	...	.....	...	.....
1918	267	1,186,155	...	.....	...	.....
1919	289	1,295,115	...	.....	...	.....
1920	373	1,530.565	...	.....	...	.....
1921	415	1,888,800	...	.....	...	.....
1922	479	2,164,050	325	1,854,590	...	.....
1924	574	3,046,790	362	2,549,490	...	.....
1925	584	3,033,682	385	2,680,052	(†)	(†)
1926	515	3,068,340	356	2,770,340	150	980,960
1927	462	3,224,307	328	2,964,427	158	1,245,890
1928	456	3,426,330	315	3,116,930	148	1,327,584
1929	463	3,719,550	341	3,454,250	170	1,487,950
1930	479	3,972,460	362	3,721,360	186	1,705,299

*Operating refineries only. †Not available previous to 1926.

Note: The reports from 1924-1930, inclusive, were compiled by The Oil and Gas Journal and the remainder by government bureaus.

It is this method of rating which the entire industry will be forced to accept in time, that makes a 10,000-bbl. refinery which is well balanced in all phases of its operation, more important as a manufacturing unit than the 20,000 or 30,000-bbl. plant which simply tops off the products most easily obtainable from a barrel of crude oil. The operations of the first type plants are reflected in the data of Table 2 which show that 186 refineries had cracking processes with a capacity of 1,705,299 bbls. daily. This expansion in capacity to secure gasoline and other products from the heavy residual oils of the skimming and topping operations represented an increase of 217,349 bbls. daily over the total for March 1, 1929. The increased investment in this expansion of cracking capacities was at least double that which was spent in increasing the rated crude oil capacity of refineries.

However, even the data on cracking facilities do not complete the story of improvement and enlargement at refineries during the past year. A study of the operations of individual refineries over the past three to five years will reveal plants which have not added to either their crude oil capacity or to their cracking capacity a single barrel. Yet some of these plants have increased their output of gasoline 15 to 40 per cent. This situation reflects the constant improvement in refinery equipment which has meant that obsolete equipment has been replaced with new units and larger yields of the most desirable products obtained. During the past year in the refining industry probably more money was expended in modernizing old equipment in this manner than was spent in facilities which added to the capacities of plants.

Lubricating Oils

Aside from the growth in skimming and cracking facilities, the past year has seen a record expansion in new equipment for the manufacture of lubricating oils and other products considered of lesser importance in the refining industry. Developments in marketing have given the necessary impetus for improvements in manufacturing all grades of lubricating oils. New equipment not only has increased yields of lubricating oils but has improved quality and the combination of the two has resulted in large expenditures in new equipment at practically all refineries which have lubricating oil plants. The numerous installations of vacuum stills, enlarged centrifuging facilities, new filtering methods, increased refrigerating capacities and new devices not generally available to the industry reflect this growth. Of minor significance to the industry generally but of great importance to some refinery operators were the expenditures made in new equipment for the manufacture of asphalts, wax and a long list of special products which are receiving more attention from the petroleum industry.

New Plants

The past year has seen the completion of several new refineries. The largest of these in crude capacity was the 35,000-bbl. plant of the General Petroleum Corp., at Torrance, Calif. The Shell Petroleum Corp. built a 20,000-bbl. plant with 10,000-bbl. cracking capacity at Houston, Tex. The last construction work at this refinery was just recently completed.

At East Chicago, the Empire Oil & Refining Co. is scheduled to start operating a 15,000-bbl. refinery this week. This plant, it is understood, will be enlarged to 25,000 bbls. daily before the end of the year. The cracking equipment at the refinery has not yet been completed. The White Star Refining Co. early in the year completed a 6,000-bbl. skimming and cracking plant near Detroit.

At Savannah, Ga., the Mexican Petroleum Corp. has started the construction of a 5,000-bbl. asphalt plant. This plant probably will be completed by mid-summer. These five plants, all of which

Survey of Operating Refineries in United States

Personnel and Plant Data

ABBREVIATIONS USED IN TABLES

Complete plant (Comp.)—Gasoline, kerosene, gas oil, fuel oil, lubricating oils, paraffin wax, petroleum coke, asphalt or both coke and asphalt, usually includes cracking. Some plants listed as complete do not manufacture asphalt or coke.
Skiming plants (S)—Gasoline, kerosene, gas oil and fuel oil.
Skimming and lub (S&L)—Gasoline, kerosene, gas oil, fuel oil and lubricating oils.
Skimming and asphalt (S&A)—Gasoline, kerosene, gas oil, fuel oil and asphalt.
Skimming, lub and asphalt (SL&A)—Gasoline, kerosene, gas oil, fuel oil, lubricating oils and asphalt.
Asphalt plant (A)—Distillates, gas oil, fuel oil and asphalt.
Topping plant (T)—Tops, distillates, gas oil and fuel oil.
Cracking (C)—Same products as skimming.
Wax plant (Wax)—Gasoline, kerosene, gas oil, fuel oil, lubricating oils and paraffin wax.
Lub plant (L)—Gas oil, fuel oil and lubricating oils.

MAILING ADDRESS

With the exception of the plant superintendents, chief engineers and chief chemists, the mailing address of the company personnel listed in this report usually is the general office of the company. The plant superintendents are reached both at the general office and plant address.

ARIZONA

Name and general offices—	President	Vice president	Secretary	Treasurer
Rio Grande Oil Co., 417 S. Hill St., Los Angeles, Calif.	See California	See California	See California	See California

ARKANSAS

Berry, James B., Sons Co. of Illinois, 6 N. Michigan Ave., Chicago, Ill.	J. D. Berry	C. E. Miller*	H. B. Pullar[1]	G. A. Ackerman
Henry H. Cross Co., 936 Peoples Gas Bldg., Chicago, Ill.	H. H. Cross	George F. Fox		
Houston Oil Co. of Texas, Petroleum Bldg., Houston, Tex.	E. H. Buckner	L. S. Zimmerman	A. H. Kennerly	L. S. Zimmerman
Kettle Creek Refining Co., P.O. Box 2011, Tulsa, Okla.	W. B. Hassett	S. H. Fredericks	W. E. N. Phillips	W. B. Hassett
Lion Oil Refining Co., Exchange Bldg., El Dorado	T. H. Barton*	T. M. Martin[4]	J. A. Crenshaw	T. H. Barton
Macmillan Petroleum Corp., 530 W. Sixth St., Los Angeles, Calif.	See California	See California	See California	See California
Ouachita Valley Refining Co., P.O. Box 1628, El Dorado	John E. Shatford*	Edward V. Stockham	E. B. Wall	C. L. Crenshaw
Root Refining Co., Commercial National Bank Bldg., Shreveport, La.	D. P. Hamilton	H. Canon[5]	T. E. Beaird	D. P. Hamilton*
Simms Oil Co., 1007 Magnolia Bldg., Dallas, Tex.	See Texas	See Texas	See Texas	See Texas

*General manager.
[1]H. B. Pullar, chief chemist; J. W. Smith, chief engineer.
[2]George H. Hartung, chief engineer; W. R. Hounsell, chief chemist.
[3]C. M. Alexander, general manager.

were built by major refinery operators, reflect the trend in locating plants at points where water transportation is available, and adjacent to large consuming points.

It is believed that before the end of the year, additional new plants will be announced. It is known that some of the larger operators who at present have inland refineries are figuring on plants better located in regard to consuming markets and transportation facilities.

In addition to the plants located along waterways, several inland plants were built. The Laurel Oil & Refining Co. is now constructing what will probably be the largest and most complete refinery in Montana. The plant will be in operation early in the summer.

The discovery of substantial production in Michigan, near Muskegon, resulted in the construction of four skimming plants, three of which are now operating. The crude supply declined rapidly preventing a further spread in refinery construction. Early in the year The Texas Company completed plants at San Antonio and El Paso, Tex., and Cody, Wyo. Several small plants were completed in the West Texas area and California.

A few small refineries mostly of the skimming type, which were shut down a year ago are now operating. The past year as a whole was not favorable for profitable operation and a large majority of the shut-down plants continued that status throughout the year. At least 75 per cent of the plants listed in this year's survey as shut down have not been operated for two or more years. In addition to the heavy deterioration, the owners in considering the resumption of operation have to take into consideration that the equipment is largely obsolete and could not compare in efficiency with refineries whose operating methods have been kept up-to-date. Due to this fact, as has been pointed out in previous years, most of these shut down refineries will never be operated and for that reason should not be considered as potential refining capacity.

TABLE 2—1930—REFINING CAPACITY IN THE UNITED STATES; RECAPITULATION BY STATES
(Capacities given in barrels daily)

State—	No. of plants	Daily crude capacities	Plants operating	Capacity operating plants	Shut-down plants	Capacity shut-down refineries	Plants with cracking production	Cracking capacities
Arizona	2	1,500	1	1,000	1	500	..	.....
Arkansas	11	49,500	9	48,000	2	1,500	6	16,750
California	67	936,000	49	890,800	18	45,200	11	160,000
Colorado	3	4,200	2	4,000	1	200	2	2,500
Georgia	1	5,000	1	5,000	..	.....	1	3,600
Illinois	14	141,200	12	135,500	2	5,700	7	80,900
Indiana	7	178,100	5	175,000	2	3,100	5	109,000
Iowa	1	1,500	..	.....	1	1,500	..	.....
Kansas	23	146,700	15	133,000	8	13,700	14	77,400
Kentucky	11	30,800	8	26,900	3	3,900	6	10,700
Louisiana	16	243,680	11	207,780	5	35,900	6	96,000
Maryland	4	61,000	3	54,000	1	7,000	2	45,597
Massachusetts	2	42,000	2	42,000	..	.....	2	28,650
Michigan	6	14,000	5	13,500	1	500	1	3,600
Missouri	3	19,500	1	14,500	2	5,000	1	15,000
Montana	20	32,300	17	30,300	3	1,950	2	2,000
New Jersey	9	312,000	9	312,000	..	.....	7	188,000
New York	4	35,500	4	35,500	..	.....	3	13,000
New Mexico	7	5,650	4	3,550	3	2,100	..	.....
Ohio	15	87,230	13	84,480	2	2,750	7	37,200
Oklahoma	61	357,800	44	313,900	20	43,900	29	117,050
Pennsylvania	50	238,800	45	236,500	5	2,300	21	87,250
Rhode Island	2	11,500	2	11,500	..	.....	1	6,000
South Carolina	1	15,000	1	15,000	..	.....	1	18,523
Tennessee	3	1,250	..	.....	3	1,250	..	.....
Texas	110	882,250	81	813,700	29	68,550	38	494,950
Utah	2	6,500	2	6,500	..	.....	1	8,500
Virginia	1	1,500	1	1,500	..	.....	..	.....
Washington	2	1,500	..	.....	2	1,500	..	.....
West Virginia	4	14,000	4	14,000	..	.....	4	12,529
Wyoming	14	95,000	11	91,900	3	3,100	8	71,200
Total	479	3,972,460	362	3,721,360	117	251,100	186	1,705,299

Major Expansions

Comparisons of the individual companies as listed in the this year's and the 1929 survey shows a rapid expansion at several plants in crude oil and cracking capacity. The Humble Oil & Refining Co. now shares with the Gulf Refining Co. the distinction of having the largest crude oil capacity, each being rated at 125,000 bbls. daily. The Gulf's plant is located at Port Arthur, Tex., and that of the Humble at Baytown, Tex.

It is understood that the Gulf expects to add new crude distillation equipment which will increase the capacity of the refinery to around 200,000 bbls. It is probable that some of the new equipment will replace older units so that the rated capacity will not reflect all of the new equipment. The Gulf also has expanded its plants at Marcus Hook, Pa., and Bayonne, N. J., both of which are relatively new refineries.

At Baton Rouge, La., the Standard Oil Co. of Louisiana has increased the capacity of its refinery from 80,000 bbls. to 100,000 bbls. daily. It is now equal in capacity to two Standard of California refineries, each of which have a rated capacity of 100,000 bbls. In the Middle West, the Standard of Indiana has increased the capacity of its Whiting, Ind., refinery to 90,000 bbls. daily so that it is now easily the largest inland refinery in the United States.

In New Jersey the Standard Oil Co. of New Jersey continues to list its group of three plants at Bayonne, Linden and Elizabeth as having a combined crude oil capacity of 180,000 bbls. daily. Over the past two years important changes have been made in the cracking facilities of the three plants and this capacity, including the plants under construction, now totals 171,000 bbls. daily.

Consolidations

The outstanding consolidation of the year involving refinery organizations is now being completed by the Standard Oil Co. of New York and the Vacuum Oil Co. This consolidation, which is subject to the final approval of the Federal Government, involves two Standard units and with subsidiary companies will materially strengthen the New York Standard's position as one of the half dozen major refinery organizations.

Previously the Standard of New York had acquired White Eagle Oil & Refining Co., operating three refineries in the Mid-Continent and Wyoming, and this company, which was reorganized under the name of the White Eagle Petroleum Corp., has been added to the subsidiary organization which already included the Magnolia Petroleum Co. and the General Petroleum Corp., two large refinery operators.

The Vacuum Oil Co. last fall acquired a controlling interest in the Lubrite Refining Co., which operates a 5,000-bbl. refinery at East St. Louis. When the

(Continued on Page 257)

Survey of Operating Refineries in United States

Personnel and Plant Data

CRACKING PROCESSES

Following is a list of cracking processes, including owners and sales representatives:

Burton—Standard Oil Co. of Indiana, 910 South Michigan Avenue, Chicago, Ill.

Cross—Gasoline Products Co., 700 Baltimore Avenue, Kansas City, Mo.; M. W. Kellogg Co., 225 Broadway, New York, N. Y. Latter company controls process covered by Black patents.

Donnelly—Smith Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo.

Dubbs—Universal Oil Products Co., 310 South Michigan Avenue, Chicago, Ill.

Fleming—M. W. Kellogg, 225 Broadway, New York, N. Y.

Holmes-Manley—The Texas Company, 17 Battery Place, New York, N. Y.

Isom—Sinclair Refining Co., 45 Nassau Street, New York, N. Y.

Jenkins—Jenkins Petroleum Process Co., Chicago, Ill.; Graver Corp., East Chicago, Ind., sales representative.

Tube & Tank—Standard Oil Co. of New Jersey, 26 Broadway, New York, N. Y.

In addition to the above, there are several processes listed in the following tables which are generally owned by the companies operating the refineries at which they are installed.

Data include plants under construction.

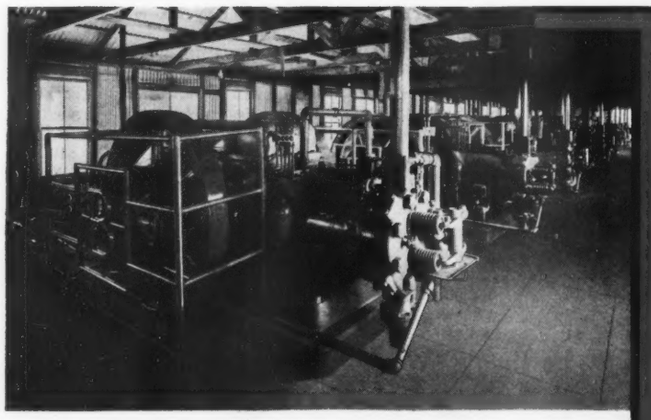
ARIZONA

Name of company—	Plant location	Daily crude capacity	Type plant	Daily crack. capacity	Type cracking unit	Plant superintendent	Sales managers: Tank car	Sales managers: Bulk and service station	Purchasing agent
Rio Grande Oil Co.	Phoenix	1,000	S-T	....		J. J. Downey	See California	See California	See California

ARKANSAS

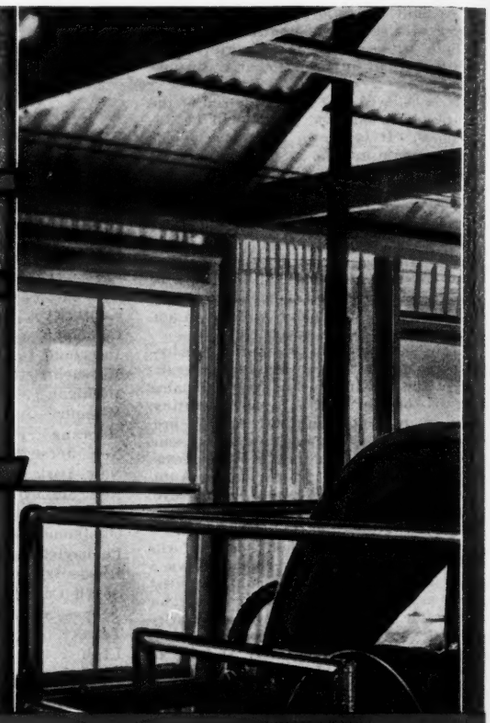
Berry, J. B., Sons Co. of Ill.	Waterloo	2,000	A	....		J. W. Smith[1]	G. H. Ackerman	G. H. Ackerman	G. H. Ackerman
Henry H. Cross.	Smackover	6,000	S	....		C. L. Murphy			Henry H. Cross Co.
Houston Oil Co. of Texas	Camden	5,500	S-C	2,000	Dubbs	George H. Hartung[2]	J. B. Benson	J. B. Benson	M. L. Clark
Kettle Creek Refining Co.	El Dorado	6,000	S-C	2,000	Dubbs	W. E. N. Phillips[3]	H. E. Ericson		
Lion Oil Refining Co.	El Dorado	12,000	S	5,500	Burton and Pipe Stills	Sylvester Dayson	W. H. Reed	T. M. Martin	R. E. Meinert
Macmillan Petroleum Corp.	El Dorado	2,000	A	....		De Ralph Frizzell	See California	See California	See California
Ouachita Valley Ref. Co.	El Dorado	2,000	S	750	Dubbs	H. J. Shatford	C. L. Crenshaw		C. L. Crenshaw
Root Refining Co.	El Dorado	10,000	S-T-L	4,500	Dubbs	Ed Kimes	D. A. Brown		F. E. Beaird
Simms Oil Co.	Smackover	2,500	S	2,000	Cross	I. H. Lantz	See Texas	See Texas	See Texas

[1] M. E. Wilson, Sylvester Dayson, vice presidents.
[2] W. W. Hepburn, Thomas S. Hale, vice presidents.



New TYPE

The little unit that is going over BIG!



COOPER-

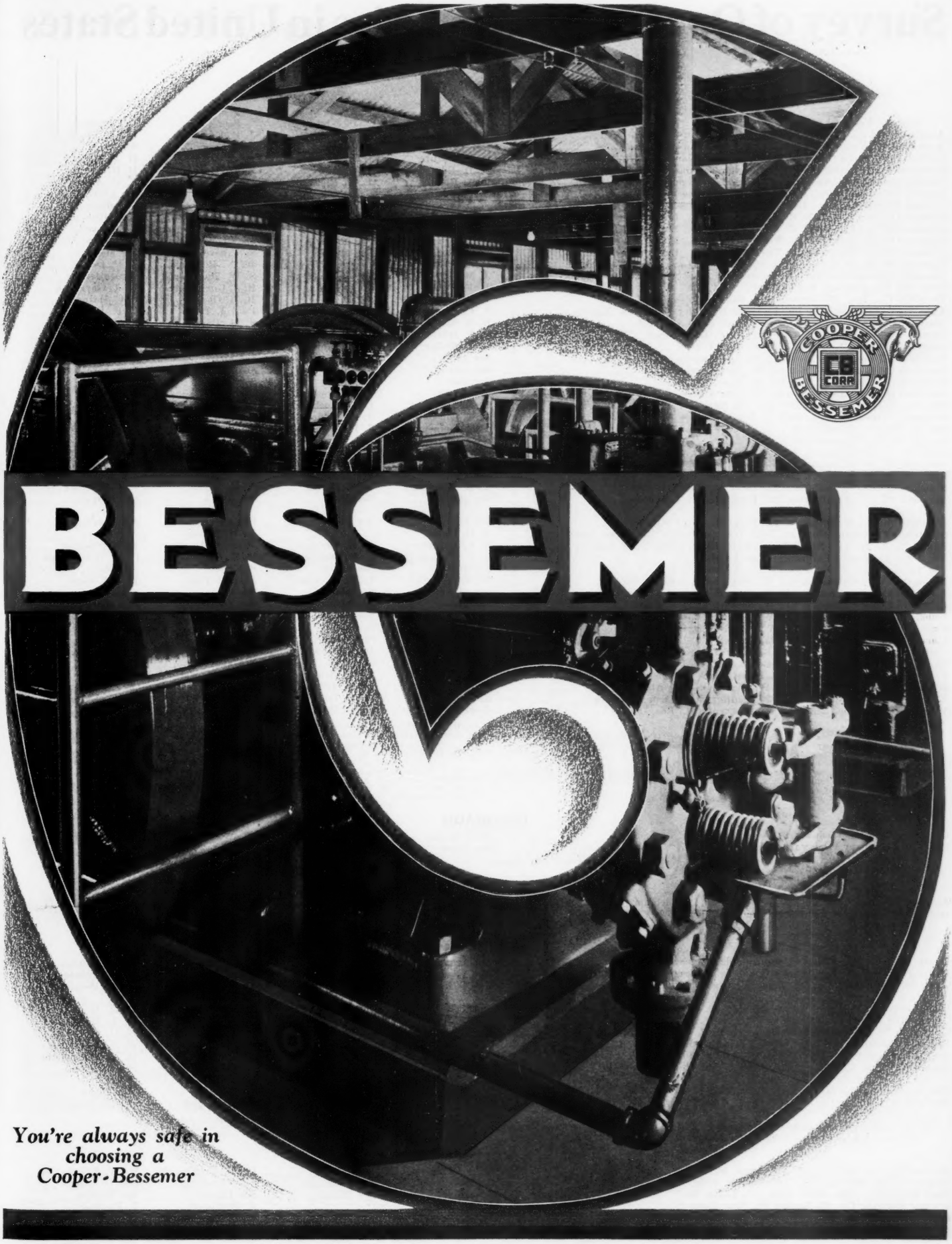
IF you were to ask us point-blank: "Why is this new Type-16 so popular?"—we'd tell you this: It comes all ready to haul, install and run. It is easy to move at any time to any place. Its low investment, installation, operating and maintenance costs enable the small producer to deliver low pressure gas at a profit. Its semi-automatic operation and downright reliability make it the logical unit for direct-drive compressor work or belt-drive power service in isolated spots. In the *above* gasoline and gas lift plant, ten of these 50-60 B. H. P. units are used in preference to one or more large engines. *Write for new Bulletin about this convertible gas or Diesel unit.*

THE COOPER-BESSEMER CORPORATION

Formerly The C. & G. Cooper Co. and The Bessemer Gas Engine Co.

Mount Vernon, Ohio Grove City, Pennsylvania

Branch offices in all principal gas and oil fields


COOPER
CB
CORP.
BESSEMER
BESSEMER
You're always safe in
choosing a
Cooper-Bessemer

Survey of Operating Refineries in United States

Personnel and Plant Data

CALIFORNIA

Name and general offices—	President	Vice president	Secretary	Treasurer
Associated Oil Co., 79 New Montgomery St., San Francisco	Wm. F. Humphrey	L. F. Bayer[1]	J. P. Edwards	W. A. Sloan
Associated Oil Co., 79 New Montgomery St., San Francisco	See above	See above	See above	See above
California Northern Corp., 1924 Broadway, Oakland	O. F. Darling	L. S. Flaherty	H. J. Steiner	H. J. Steiner
Edington-White Refining Co., 570 Subway Terminal Bldg., Los Angeles	C. B. Edington*	H. J. Witz[2]	R. H. Harms	H. H. Schupp
General Petroleum Corp., Higgins Bldg., Los Angeles	J. A. Brown	E. R. Rich[4]	D. W. Woods	F. C. Adams
General Petroleum Corp., Higgins Bldg., Los Angeles	See above	See above	See above	See above
General Petroleum Corp., Higgins Bldg., Los Angeles	See above	See above	See above	See above
Gilmore Oil Co., Ltd., 2423 E. Twenty-eighth St., Los Angeles	E. B. Gilmore	C. S. Bessemyer*	S. M. Salisbury	C. S. Bessemyer
Gilmore Oil Co., Ltd., 2423 E. Twenty-eighth St., Los Angeles	See above	See above	See above	See above
Gilmore Oil Co., Ltd., 2423 E. Twenty-eighth St., Los Angeles	See above	See above	See above	See above
Gilmore Oil Co., Ltd., 2423 E. Twenty-eighth St., Los Angeles	See above	See above	See above	See above
Hancock Oil Co. of California, Security Bldg., Long Beach	Will J. Reid*	George D. Williams	W. N. Reagan	G. P. Deane
Hercules Gasoline Co., 2411 E. Thirtieth St., Los Angeles	A. Mattei*		S. W. Harkleroad	A. Mattei, Jr.
Holly Oil Co., Colorado Springs, Colo.	A. E. Carlton	Wiley Blair, Jr.[7]	R. J. Garritson	R. J. Garritson
Paraffine Co., Inc., 475 Brannan St., San Francisco, Calif.	R. S. Shainwald*	W. H. Love	R. H. Ohea	S. C. Irving
Lake View Oil & Refining Co., Edwards & Wildey Bldg., Los Angeles	F. C. Skinner*	A. J. Rehwold	Paul J. Hisey	C. F. Powers
Macmillan Petroleum Corp., 530 W. Sixth St., Los Angeles	R. S. Macmillan	Alfred Macmillan[8]	S. M. Batterson	S. M. Batterson
Olympic Refining Co., 2425 California Ave., Long Beach	C. P. Ritter*	W. W. Shorthill[9]	D. T. Buckley	D. T. Buckley
Richfield Oil Co., 215 W. Seventh St., Los Angeles	C. M. Fuller*	R. W. McKee[16]	Bradford M. Melvin	W. E. Hart
Richfield Oil Co., 215 W. Seventh St., Los Angeles	See above	See above	See above	See above
Richfield Oil Co., 215 W. Seventh St., Los Angeles	See above	See above	See above	See above
Richfield Oil Co., 215 W. Seventh St., Los Angeles	See above	See above	See above	See above
Richfield Oil Co., 215 W. Seventh St., Los Angeles	See above	See above	See above	See above
Rio Grande Oil Co., 417 S. Hill St., Los Angeles	L. E. Lockhart	L. M. Lockhart[10]	L. M. Lockhart*	Charles S. Jones
Seaboard Petroleum Corp., 2474 E. Ninth St., Los Angeles	A. E. Gibson	J. M. Feldman*	Howard M. Miles	Howard M. Miles
Seaside Oil Co., Summerland	A. M. Heineman	J. F. Bushnell*	M. W. O'Brien	J. F. Bushnell
Seaside Oil Co., Summerland	See above	See above	See above	See above
Shell Oil Co. of California, 200 Bush St., San Francisco	C. Legh-Jones	H. R. Gallagher[18]	A. R. Bradley	John Lauder
Shell Oil Co. of California, 200 Bush St., San Francisco	See above	See above	See above	See above
Shell Oil Co. of California, 200 Bush St., San Francisco	See above	See above	See above	See above
Standard Oil Co. of California, 225 Bush St., San Francisco	K. R. Kingsbury	R. J. Hanna[11]	J. H. Tuttle	R. C. Warner
Standard Oil Co. of California, 225 Bush St., San Francisco	See above	See above	See above	See above
Standard Oil Co. of California, 225 Bush St., San Francisco	See above	See above	See above	See above
St. Helens Petroleums Co., Ltd., 1026 Western Pacific Bldg., Los Angeles	H. H. Haldin[12]		R. H. Young	
Sunset-Pacific Oil Co., Ninth floor, Pacific-Electric Bldg., Los Angeles	H. L. Carnahan	E. R. Sheldon[12]	Mildred Murphy	E. R. Sheldon
The Texas Company (California), Los Angeles	R. C. Holmes	C. E. Olmstead[17]	E. M. Crone	C. E. Woodbridge
The Texas Company (California), Los Angeles	See above	See above	See above	See above
Union Oil Co. of California, 617 W. Seventh St., Los Angeles	W. L. Stewart	L. P. St. Clair	John McPeak	R. J. Keown
Union Oil Co. of California, 617 W. Seventh St., Los Angeles	See above	See above	See above	See above
Union Oil Co. of California, 617 W. Seventh St., Los Angeles	See above	See above	See above	See above
Union Oil Co. of California, 617 W. Seventh St., Los Angeles	See above	See above	See above	See above
Union Oil Co. of California, 617 W. Seventh St., Los Angeles	See above	See above	See above	See above
Union Oil Co. of California, 617 W. Seventh St., Los Angeles	See above	See above	See above	See above
United States Refining Co., 1001 Board of Trade Bldg., Los Angeles	Carl J. von Bibra	W. A. Kirk[20]	Earl F. Dimond	Earl F. Dimond
United States Refining Co., 1001 Board of Trade Bldg., Los Angeles	See above	See above	See above	See above
Vernon Oil Refining Co., 2500 E. Twenty-sixth St., Los Angeles	J. A. Brower	E. O. Brower	W. N. Brower	W. N. Brower
Western Oil & Refining Co., 416 W. Eighth St., Los Angeles	Richard Florian*	R. R. Rakestraw[14]	A. A. G. Scherbel	A. A. G. Scherbel
Western States Petroleum Corp., 255 California St., San Francisco	R. L. Durbrow*	G. F. Garrett	M. C. Lintell	M. C. Lintell
Wilshire Oil Co., Inc., 2455 E. Twenty-seventh St., Los Angeles	George T. Machris	Alfred P. Machris	Alfred P. Machris	

*General manager.
[1]L. D. Jurs, E. L. Shea, W. A. Sloan, vice presidents; O. P. Cottrell, manufacturing manager; H. B. Haney, chief engineer; L. Mittelman, chief chemist.
[2]E. J. Lange, chief chemist.
[3]H. J. Witz, chief engineer.
[4]R. A. Sperry, vice president and general manager; R. E. Maynard, W. L. McLain, A. L. Weil, vice presidents; S. J. Dickey, manager of manufacturing and chief engineer; G. F. Olsen, chief chemist.
[5]E. J. Sanders, chief engineer; R. H. Pierson, chief chemist.
[6]R. M. Hall, chief engineer; F. C. Parris, chief chemist.
[7]C. A. Johnson, vice president and general manager; J. H. Grimes, chief engineer; J. R. Grizzle, chief chemist.
[8]H. R. Macmillan, M. D. Macmillan, vice presidents; E. E. Boner, vice president and superintendent of refineries; C. C. Benz, chief engineer; S. E. Campbell, chief chemist.
[9]J. I. Tognetti, vice president; Frederick Dewart, chief chemist.
[10]Charles S. Jones, A. M. Lockhart, vice presidents.
[11]H. M. Storey, H. T. Harper, W. H. Berg, vice presidents.
[12]H. H. Haldin, chairman of board; Charles Drader, general manager.

COLORADO

Continental Oil Co. (Delaware), Ponca City, Okla.	D. J. Moran	W. H. Ferguson[1]	W. W. Bruce	G. F. Smith
The Texas Company (Delaware), Houston, Tex.	See Texas	See Texas	See Texas	See Texas

[1]W. W. Bruce, E. J. Nicklos, Walter Miller, E. S. Karstedt, vice presidents; Ray Russell, chief engineer; A. Henrickson, chief chemist.

GEORGIA

Atlantic Refining Co., The, 260 S. Broad St., Philadelphia, Pa.	See Pennsylvania	See Pennsylvania	See Pennsylvania	See Pennsylvania
Mexican Petroleum Corp., 122 E. 42nd St., New York	See Louisiana	See Louisiana	See Louisiana	See Louisiana

[1]Plant under construction. Initial capacity 5,000 bbls. daily.

ILLINOIS

Henry H. Cross Co., 936 Peoples Gas Bldg., Chicago, Ill.	See Arkansas	See Arkansas	See Arkansas	See Arkansas
Henry H. Cross Co., 936 Peoples Gas Bldg., Chicago, Ill.	See Arkansas	See Arkansas	See Arkansas	See Arkansas
Globe Oil & Refining Co. of Illinois, Blackwell, Okla.	I. A. O'Shaughnessy*	F. L. Jehle	G. G. Woodruff	G. G. Woodruff
Indian Refining Co., Inc., Lawrenceville	J. H. Graham	Frank Fritts[1]	D. G. Siemer	B. R. Wylie
Lincoln Oil Refining Co., Robinson	J. K. Kerr	H. B. Carpenter*	W. B. Filson	F. A. Billstone
Lubrite Refining Corp., 3504 Washington Blvd., St. Louis, Mo.	H. T. Ashton[2]*	W. H. Ware	P. J. Buttles	G. C. Goller
Red River Refining Co., Inc., 77 W. Washington, Chicago, Ill.	Thomas Flynn	E. F. Buchanan	John E. Schulze	E. F. Buchanan
Shell Petroleum Corp., Shell Bldg., St. Louis, Mo.	U. deB. Daly	T. F. Lydon[6]	P. R. Chenoweth	P. R. Chenoweth
Standard Oil Co. (Indiana), 910 S. Michigan Ave., Chicago, Ill.	See Indiana	See Indiana	See Indiana	See Indiana
The Texas Company (Delaware), Houston, Tex.	See Texas	See Texas	See Texas	See Texas
White Star Refining Co., 903 W. Grand Blvd., Detroit, Mich.	See Michigan	See Michigan	See Michigan	See Michigan

*General manager.
[1]A. H. White, B. H. Anglin, vice presidents; J. B. Robinson, comptroller; H. K. Hashbarger, chief engineer; J. Laudermill, chief chemist.
[2]R. H. Nicholson, chief engineer; T. W. Culmer, chief chemist.
[3]W. W. Strickler, chairman of the board.

INDIANA

Bartles-Maguire Oil Co., 539 Broadway, Milwaukee, Wis.	A. G. Maguire	H. J. Stolz[1]	R. W. Fritzke, Jr.	R. W. Fritzke, Jr.
Empire Oil & Refining Co., Tulsa Trust Bldg., Tulsa	See Oklahoma	See Oklahoma	See Oklahoma	See Oklahoma
Shell Petroleum Corp., Shell Bldg., St. Louis, Mo.	See Illinois	See Illinois	See Illinois	See Illinois
Sinclair Refining Co., 45 Nassau St., New York	E. W. Sinclair		A. Stefumetz	J. Fletcher
Standard Oil of Indiana, 910 S. Michigan Ave., Chicago, Ill.	E. G. Seubert	Allan Jackson[2]	F. T. Graham	C. J. Barkdull

[1]J. M. McLaughlin, William Hildebrandt, vice presidents; W. W. Reed, chief chemist.
[2]R. H. McElroy, R. E. Humphreys, C. J. Barkdull, E. J. Bullock, vice presidents.

Survey of Operating Refineries in United States

Personnel and Plant Data

CALIFORNIA

Name of company—	Plant location	Daily crude capacity	Type plant	Daily crack. capacity	Type cracking unit	Plant superintendent	Sales managers: Tank car	Sales managers: Bulk and service station	Purchasing agent
Associated Oil Co	Avon	58,500	S-L	....		W. P. Hugo	B. I. Graves	B. I. Graves	A. P. MacKillop
Associated Oil Co	Watson	18,000	S	....		F. E. Coyle[2]	See above	See above	See above
California Northern Corp.	Coalinga	200	L	....		William Powers	L. F. Miklheim	L. F. Miklheim	
Edington-Witz Refining Co.	Signal Hill	4,500	S	....		W. E. Snowden	C. B. Edington	D. J. Williams	
General Petroleum Corp.	Vernon	50,000	Comp.	3,000	Vapor Phase	Fred Isaacs	E. R. Rich	E. R. Rich	R. M. Ketchum
General Petroleum Corp.	Torrance	35,000	S	....			See above	See above	See above
General Petroleum Corp.	Olinda	2,000	T	....			See above	See above	See above
Gilmore Oil Co., Ltd.	Los Angeles	4,500	A	....		Herb. L. Eggleston	J. L. Coates	B. A. Rowell	C. P. Boone
Gilmore Oil Co., Ltd.	Vernon	2,500	A	....			See above	See above	See above
Gilmore Oil Co., Ltd.	Los Angeles	1,000	A	....			See above	See above	See above
Gilmore Oil Co., Ltd.	Santa Maria	1,000	A	....			See above	See above	See above
Hancock Oil Co. of Calif.	Long Beach	12,000	S	....		H. D. Tupper	George D. Williams	George D. Williams	W. Westegard
Hercules Gasoline Co.	Los Angeles	5,000	S-C	2,000	Jenkins	C. R. Bird[6]	S. V. Millington	John Norton	R. E. Hawley
Holly Oil Co.	Hunt. Beach	3,000	S	....		J. H. Grimes	C. A. Johnson		S. W. Baker
Paraffine Co., Inc.	Emeryville	1,200	A	..					A. H. Silverstone
Lake View Oil & Ref. Co.	Maricopa	3,000	S	....		George E. Holmes			
Macmillan Petroleum Corp.	Long Beach	7,000	S	....		L. L. Rebber	Joseph Zeppa	D. R. Wilson	S. M. Batterson
Olympic Refining Co.	Long Beach	5,000	S	..		T. J. Ryan	Philip E. Johnson	Philip E. Johnson	M. L. Wyatt
Richfield Oil Co.	Hynes	55,000	S-C	14,000	Cross	A. M. Kelley	J. C. Graves	C. B. Garretson	A. W. Buchanan
Richfield Oil Co.	Watson	65,000	Comp.	14,000	Black	See above	See above	See above	See above
Richfield Oil Co.	Bakersfield	2,000	S	....		See above	See above	See above	See above
Richfield Oil Co.	Fellows	3,000	S	....		See above	See above	See above	See above
Richfield Oil Co.	Los Angeles	4,000	S	....		See above	See above	See above	See above
Rio Grande Oil Co.	Vinvale	10,000	S-C	4,000	Jenkins	J. J. Downey	J. N. Reed	J. N. Reed	H. H. Kelley
Seaboard Petroleum Corp.	Los Angeles	2,000	S	....		Wm. Rorrison	E. L. Duntley	Howard M. Miles	F. J. Burmester
Seaside Oil Co.	Summerland	2,000	A	....		D. C. Peet	J. F. Bushnell	Winslow Bushnell	Edgar Beresford
Seaside Oil Co.	Ventura	4,000	S	....		See above	See above	See above	See above
Shell Oil Co. of California	Martinez	} 100,000	Comp.	} 54,000	Shell, Dubbs	C. O. F. Jenkin	H. R. Gallagher	H. R. Gallagher	J. C. Storey
Shell Oil Co. of California	Watson		Comp.		Shell, Dubbs	J. F. M. Taylor	See above	See above	See above
Shell Oil Co. of California	Coalinga		T			C. O. F. Jenkin	See above	See above	See above
Standard Oil Co. of Calif.	Richmond	100,000	Comp.	20,000	Richmond, Dubbs	F. H. Smith[18]	J. L. Quinn[19]	J. L. Quinn	F. P. Summers
Standard Oil Co. of Calif.	El Segundo	100,000	Comp.	2,000	Modified Richmond, Dubbs	H. C. Hanna	See above	See above	See above
Standard Oil Co. of Calif.	Bakersfield	25,000	S-A	....		J. F. Faber	See above	See above	See above
St. Helens Pet. Co., Ltd.	Near Pico	3,000	T	....		C. Z. Webb	Charles Drader	Charles Drader	W. H. Cowie
Sunset Pacific Oil Co.	Vernon	10,000	S	....		Frank A. Milliff	E. L. Duntley	H. H. Whitset	A. V. Halbert
The Texas Company (Calif.)	Watson	30,000	S-L-C	7,000	Holmes-Manley	W. J. Ryan	R. T. Herndon	R. T. Herndon	A. F. Colling
The Texas Company (Calif.)	Fillmore	4,000	S-C	4,000	Holmes-Manley	J. R. Scanlin	See above	See above	See above
Union Oil Co. of California	Oleum	30,000	S-L-A	....		A. Roy Heise	†	†	†
Union Oil Co. of California	Brea	6,000	S	....		C. W. Jennings	See above	See above	See above
Union Oil Co. of California	Los Angeles	55,000	S-C-A	36,000	Cross	C. G. Brownlee	See above	See above	See above
Union Oil Co. of California	Santa Paula	900	S	....		C. W. Burtless	See above	See above	See above
Union Oil Co. of California	Maltha	5,000	S	....		Homer Ambrosier	See above	See above	See above
Union Oil Co. of California	Arvila	10,000	S	....		R. W. Frazier	See above	See above	See above
United States Refining Co.	Hynes	5,000	S	....		W. R. Cowan			F. S. Moore, Jr.
United States Refining Co.	Torrance	1,500	S	....		See above			See above
Vernon Oil Refining Co.	Vernon	3,000	S	....		W. G. Darlington	W. N. Brower	P. N. Hinman	
Western Oil & Refining Co.	Wilmington	12,000	S	....		O. C. Smith	A. A. G. Scherbel	A. A. G. Scherbel	
Western States Pet. Corp.	Long Beach	5,000	S	....		L. Y. Mattes[18]			E. E. Greiner
Wilshire Oil Co.	Vernon	25,000	S	....		C. E. Jones			C. S. Hough

[12]D. L. Mayhew, A. W. Shepherd, vice presidents; E. H. Broughton, M. V. Moulton, chief engineer; O. J. Clark, chief chemist.
[14]A. W. Taylor, vice president in charge of production; E. J. McKee, construction engineer; A. L. Lord, chief chemist.
[15]F. A. Milliff, chief engineer; F. C. Squier, chief chemist.
[16]C. B. Garretson, J. C. Graves, A. M. Kelley, Bradford M. Melvin, J. S. Wallace, vice presidents; H. W. Carr, chief engineer.
[17]J. A. Bermingham, R. T. Herndon, L. R. Holmes, W. S. S. Rodgers, vice presidents; Mr. Holmes is refinery manager and Mr. Herndon is in charge of sales.
†V. H. Kelly, domestic distribution; J. B. Arthur, fuel oil and asphalt; W. A. Raine, manager research and development; H. C. Farquhar, manager of purchases.
[18]Manufacturing department of Standard of California follows: General manager of refineries, J. F. Brooks; chief engineer, Max Thornburg; chief chemist, J. B. Terry; manager, Richmond refinery, R. T. Osborn; manager, El Segundo refinery, A. S. Russell.
[19]Mr. Quinn is general sales representative. Mr. Kennedy is chairman of the sales committee.
[20]W. R. Cowan, vice president.

COLORADO

Continental Oil Co.	Florence	3,000	S-C	1,500	Burton	C. R. Tillman	L. R. Milne	L. R. Milne	W. H. O'Connor
The Texas Company (Del.)	Craig	1,000	S-C	1,000	Holmes-Manley	G. O. Shefstead	See Texas	See Texas	See Texas

GEORGIA

Atlantic Refining Co., The	Brunswick	5,000	Comp.	3,600	Lewis	M. J. Welsh	See Pennsylvania	See Pennsylvania	See Pennsylvania
Mexican Petroleum Corp.	Savanah		A[1]			H. T. Halin	See Louisiana	See Louisiana	See Louisiana

ILLINOIS

Henry H. Cross Co.	Joliet	2,000	S	....		M. L. Berryman			See Arkansas
Henry H. Cross Co.	Dupo	1,000	S	....		L. V. Owens			See Arkansas
Globe Oil & Refining Co. of Illinois	Lemont	5,000	S	....		D. B. Kelly	A. E. Landsittel		F. L. Jehle
Indian Refining Co.	Lawrenceville	15,000	Comp.	10,000	Cross & Dubbs	P. Wells	R. D. McDorman	A. H. White	F. B. Upham
Lincoln Oil Refining Co.	Robinson	10,000	Comp.	7,200	Holmes-Manley	R. E. Luton[2]	N. T. Stover	N. T. Stover	H. B. Carpenter
Lubrite Refining Corp.	East St. Louis	3,500	S-C	1,200	Fleming	D. A. Windsor[4]	W. H. Ware	W. H. Ware	J. H. MacCrea
Red River Refining Co.	Burnham	1,000	L-A	....		C. A. Harris[5]	E. F. Buchanan		
Shell Petroleum Corp.	Wood River	46,000	L-C	20,500	Cross & Dubbs	E. H. Schippers	L. van Eeghen	L. van Eeghen	C. B. Singleton
Standard Oil Co. (Indiana)	Wood River	30,000	Comp.	30,000	Burton and Holmes-Manley	C. B. Manbeck	See Indiana	See Indiana	See Indiana
The Texas Company	Lockport	12,000	Comp.	9,000	Holmes-Manley	G. B. Bogart	See Texas	See Texas	See Texas
White Star Refining Co.	Wood River	5,000	S-C	3,000	Dubbs	S. G. Keller	See Michigan	See Michigan	See Michigan

[4]R. A. Fremont, chief engineer; L. Dolson, chief chemist.
[5]R. S. Watt, chief engineer; James Hart, chief chemist.
[6]Dr. W. H. van Holst Pellekaan, E. L. Miller, Dr. F. W. Tydeman, G. S. Rollin, vice presidents; S. Peterson, chief engineer.

INDIANA

Bartles-Maguire Oil Co.	East Chicago	3,000	T-C	2,000	Jenkins	William Hildebrandt	H. J. Dolan	J. M. McLaughlin	H. A. Steffen
Empire Oil & Ref. Co.	East Chicago	15,000	S-C	6,000	Doherty	E. H. Roy	See Oklahoma		See Oklahoma
Shell Petroleum Corp.	East Chicago	27,000	T-C	10,000	Dubbs	Dr. R. H. Waser	See Illinois	See Illinois	See Illinois
Sinclair Refining Co.	East Chicago	40,000	S-L-C	35,000	Isom	R. J. Black			H. B. Malone
Standard Oil Co. of Indiana	Whiting	90,000	Comp.	56,000	Burton, Cross, Holmes-Manley	H. F. Glair	Allan Jackson	Allan Jackson	E. J. Bullock

Cupola superintendents in Crane foundries have the chemical make-up of their metals at their finger-tips

Cupolas . . . controlled from the laboratory

White hot rivers of metal, pouring from big cupolas in Crane foundries, are even more thoroughly analyzed, more carefully watched, than the drinking water pouring from a faucet in a well-ordered city.

Because correct chemical ingredients in valve metals are as essential to absolute safety and right functioning in the oil and gas industries as pure water to human health, Crane Co. has always maintained laboratory control of its cupolas.

This means that experts in the metallurgical and physical testing of metals are responsible for the quality of every valve and fitting turned out. It means that tensile strength, yield point, elongation, and reduction of area of test bars taken every hour of the day's run are known to laboratory and cupola chemists.

It means that constantly, as the metal pours out, the proportion of silicon, manganese, carbon, phosphorus, sulphur, pure iron, are known and uniformly maintained. It means immediate correction of any variation and rejection of faulty materials.

From specifications of raw materials, through recommending the right materials for the right place, to final installation and use, Crane Co. knows its products and what they will do. To place this knowledge at the service of consulting and plant engineers, specialists in piping materials and layout are kept at strategic points throughout the country. A call will bring them to you.

CRANE

PIPING MATERIALS TO CONVEY AND CONTROL STEAM, LIQUIDS, OIL, GAS, CHEMICALS

GENERAL OFFICES: 836 S. MICHIGAN AVE., CHICAGO
NEW YORK OFFICES: 23 W. 44TH STREET

Branches and Sales Offices in One Hundred and Ninety Cities

1855
SEVENTY-FIFTH
ANNIVERSARY
1930

Test bars are broken every hour of the day's run

Survey of Operating Refineries in United States

Personnel and Plant Data

KANSAS

Name and general offices—	President	Vice president	Secretary	Treasurer
Barnsdall Refineries, Inc., Box 2091, Tulsa, Okla.	See Oklahoma	See Oklahoma	See Oklahoma	See Oklahoma
Derby Oil Co., 352 N. Lawrence Ave., Wichita	A. L. Derby*	R. E. Wilsey[6]	E. Wasser	E. C. Claiborne
Eldorado Refining Co., Box 191, Eldorado	Charles G. Yankey	Robert H. Hazlett	T. A. Helling*	Robert H. Bradford
Golden Rule Refining Co., 120 W. First St., Wichita	Elbert S. Rule		W. C. Long	W. C. Long
Independent Oil & Gas Co., Philtower Bldg., Tulsa, Okla.	See Oklahoma	See Oklahoma	See Oklahoma	See Oklahoma
Kanotex Refining Co., East Tyler Ave., Arkansas City	C. M. Boggs	W. L. Lesh	E. K. Childers	R. R. Cox
National Refining Co., 1404 E. Ninth St., Cleveland, Ohio	See Ohio	See Ohio	See Ohio	See Ohio
Peerless Oil & Refining Co., Chanute	F. E. Reinhardt*	Elmer M. Cooper	C. O. Nelson	C. O. Nelson
Shell Petroleum Corp., Shell Bldg., St. Louis, Mo.	See Illinois	See Illinois	See Illinois	See Illinois
Sinclair Refining Co., 45 Nassau St., New York, N. Y.	See Indiana	See Indiana	See Indiana	See Indiana
Sinclair Refining Co., 45 Nassau St., New York, N. Y.	See Indiana	See Indiana	See Indiana	See Indiana
Skelly Oil Co., Skelly Bldg., Tulsa, Okla.	W. G. Skelly	F. A. Pielsticker[3]	F. T. Hopp	F. T. Hopp
Standard Oil Co. of Kansas, Neodesha	A. S. Hopkins	E. A. Warren	A. L. Morrison	A. L. Morrison
Vickers Petroleum Co. of Delaware, Wheeler-Kelly-Hagny Bldg., Wichita	J. A. Vickers	C. L. Henderson*	J. S. Wertz	J. S. Wertz
White Eagle Oil Corp., 1400 Federal Reserve Bank Bldg., Kansas City, Mo.	R. R. Irwin.	E. A. Kermott[5]	Milo T. Jones	Arthur T. Allen

*General manager.
[1]H. J. Datin, chief chemist.
[2]E. R. Trask, chief engineer; Guy S. Kirk, chief chemist.
[3]C. C. Herndon, H. M. Stalcup, R. D. Lyons, vice presidents; J. M. Shea, chief engineer; Dr. C. K. Francis, chief chemist.

KENTUCKY

Aetna Oil Service, Inc., 1202 S. Third St., Louisville	Martin J. Quinn	Curtis C. Webb*	H. J. Flanders	A. T. Judy
Ashland Refining Co., Inc., Ashland National Bank Bldg., Ashland	Thomas A. Combs	T. A. Field[4]	E. L. McDonald	R. W. Grossenbach
Glasgow Oil & Refining Co., Glasgow	R. B. Tyler	T. P. Dickinson	Sewell C. Harlin*	Sewell C. Harlin
Latonia Refining Corp., East Ohio Gas Bldg., Cleveland, Ohio[7]	See Ohio	See Ohio	See Ohio	See Ohio
Louisville Refining Co., Inc., U. S. Trust Bldg., Louisville	W. S. Dudley	Eli H. Brown, Jr.[1]	H. R. Smith	H. R. Smith
Standard Oil Co. of Kentucky, Louisville[5]	W. E. Smith	J. C. Steidle	J. O. McGoodwin	J. C. Steidle
Stoll Oil Refining Co., 227 W. Main St., Louisville	C. C. Stoll	George J. Stoll[2]	Albert S. Prinz	William A. Stoll
The Texas Company, Houston, Tex.	See Texas	See Texas	See Texas	See Texas

*General manager.
[1]J. Fred Miles, vice president and general manager; J. R. Currey, chief chemist.
[2]Berry V. Stoll, Charles E. Stoll, vice presidents; Ben Walton, chief engineer; Clem Luce, chief chemist.

LOUISIANA

Bayou State Refining Corp., 1012 Slattery Bldg., Shreveport	Frank M. Cook	Sidney M. Cook	J. F. Knox	Frank M. Cook*
Chalmette Petroleum Corp., 912 Union Indemnity Bldg., New Orleans	W. E. Winship*	C. D. Antoni[2]	R. P. Batson	William Leftwich
Crystal Oil Refining Corp., Commerce National Bank Bldg., Shreveport	S. P. Clark	J. H. Riedemann*	R. Jamison	R. Jamison
Dartois Oil Refinery, 816 Slattery Bldg., Shreveport	Partnership (not incorporated)[4]			
Dixie Oil Co., Inc., Philcade Bldg., Tulsa, Okla.	A. W. Peake	A. M. McCorkle[5]	A. M. McCorkle	A. M. McCorkle
Louisiana Oil Refining Corp., First National Bank Bldg., Shreveport	M. J. Grogan	B. P. Crittenden[6]	C. R. Harrison	T. H. Grobe
Mexican Petroleum Corp. of Louisiana, 122 E. Forty-second St., New York, N. Y.	R. G. Stewart	P. H. Harwood[7]	L. W. Bernhard	A. N. Penn
Shell Petroleum Corp., Shell Bldg., St. Louis, Mo.	See Illinois	See Illinois	See Illinois	See Illinois
Shreveport-El Dorado Pipe Line Co., Slattery Bldg., Shreveport	William Lilley	B. H. Gray[8]	J. F. Atkins	B. H. Gray
Standard Oil Co. of Louisiana, Baton Rouge	D. R. Weller	A. K. Gordon[9]	J. A. Bechtold	A. K. Gordon
The Texas Company (Delaware), Houston, Tex.	See Texas	See Texas	See Texas	See Texas

*General manager.
[1]F. M. Reed, chief engineer; Mrs. T. W. Reed, chief chemist.
[2]Charles Leftwich, William Leftwich, B. C. McClellan, W. Irving Moss, vice presidents; Aaron Abramson, chief chemist.
[3]L. C. Atchison, chief chemist.
[4]J. E. Slattery, general manager.
[5]F. O. Prior, vice president and chief engineer.
[6]George E. Hite, vice president; H. R. Smith, chief chemist; A. W. Trusty, chief chemist.

MARYLAND

Continental Oil Co. (Delaware), Ponca City, Okla.	See Oklahoma	See Oklahoma	See Oklahoma	See Oklahoma
Mexican Petroleum Corp., 122 E. Forty-second St., New York, N. Y.	See Louisiana	See Louisiana	See Louisiana	See Louisiana
Standard Oil Co. of New Jersey, 26 Broadway, New York, N. Y.	See New Jersey	See New Jersey	See New Jersey	See New Jersey

MASSACHUSETTS

Beacon Oil Co., Inc., Everett	Richard B. Kahle	L. J. Walsh[1]	H. W. Boutilier	E. N. Wrightington
Cities Service Refining Co., 260 Tremont St., Boston	H. L. Doherty	H. Frueauff[2]	J. V. Koons	L. F. Musil

[1]E. N. Wrightington, H. H. Hewetson, vice presidents; H. L. Bolton, chief engineer; W. W. Peters, chief chemist.
[2]J. S. Cordell, vice president and general manager; H. A. Mott, chief engineer; W. W. Scheumann, chief chemist.

MICHIGAN

Henry H. Cross Co., 936 Peoples Gas Bldg., Chicago, Ill.	See Arkansas	See Arkansas	See Arkansas	See Arkansas
Michigan Central Refining Co., North Muskegon	J. D. Wrather	C. T. Maguire	T. F. Caldwell*	T. F. Caldwell
Old Dutch Refining Co., Box 442, Muskegon	Walter E. Anderson	E. L. Hughes[3]	John Borden	John Borden
White Star Refining Co., 903 W. Grand Blvd., Detroit	H. B. Earhart	H. A. Coffin[1]	C. B. McCollough	W. V. Butler
Standard Oil Co. of Indiana, 910 S. Michigan Ave., Chicago, Ill.	See Indiana	See Indiana	See Indiana	See Indiana

[1]L. R. Hunter, J. B. Edwards, vice presidents; Dr. E. H. Potthoff, chief engineer and chief chemist.
[2]Walter Schuttler, chairman of board. R. A. Cronwell, chief chemist.
*General manager.

MISSOURI

Standard Oil Co. of Indiana, 910 S. Michigan Ave., Chicago, Ill.	See Indiana	See Indiana	See Indiana	See Indiana

MONTANA

Arro Oil & Refining Co., 606 Montana Bldg., Lewistown	H. H. Schwartz	Ed L. Allen*	Guy R. Enlow	Ed L. Allen
Associated Gas & Oil Co., Anaconda Highway, Butte	Kenneth Christie	J. Bruce Kremer	Alfred C. Torgerson	Alfred C. Torgerson
Big West Oil Co., 614 Hutton Bldg., Spokane, Wash.	W. S. Hawley	John E. Orr	L. R. Hawley	L. R. Hawley*
Conrad Refining Co., P.O. Box 725, Conrad	Perry L. Withers*		William F. Gast	William F. Gast
Hart Refineries, Missoula	Charles W. Hart		E. G. Hart	E. G. Hart
Hart Refineries, Missoula	See above		See above	See above
Laurel Oil & Refining Co., Guaranty Trust Bldg., Portland, Ore.	Alfred J. Diescher	William P. Lipman[3]	Roscoe C. Nelson	Roscoe C. Nelson
Lewistown Oil & Refining Co., Lewistown	Frank P. Book	C. W. Buntin	Addison E. Holton	Harold L. Wadsworth
Russell Oil Co., 642 Utah Ave., Butte	Joseph Russell, owner			
Russell Oil Co., 642 Utah Ave., Butte	See above			
Shelby Pipe Line & Refining Co., Shelby	James A. Johnson	James W. Johnson*	P. R. Mac Hale	P. R. Mac Hale
Snow Cap Oil Co., Sunburst	Adam J. Eulberg*	Edward F. Eulberg	B. A. Eulberg	B. A. Eulberg

Survey of Operating Refineries in United States

Personnel and Plant Data

KANSAS

Name of company—	Plant location	Daily crude capacity	Type plant	Daily crack. capacity	Type cracking unit	Plant superintendent	Sales managers— Tank car	Bulk and service station	Purchasing agent
Barnsdall Refineries, Inc.	Wichita	4,000	C	1,500	Dubbs	Frank S. Horn			See Oklahoma
Derby Oil & Refining Corp.	Wichita	6,000	S-C	2,200	Dubbs	Eugene Sapp	C. A. Keller		R. E. Cowan
Eldorado Refining Co.	Eldorado	4,500	S-C	2,000	Winkler-Koch	G. C. Anderson[4]	C. W. Rice		O. G. Jackson
Golden Rule Refining Co.	Wichita	1,000	S-C	1,200	Jenkins	W. C. Long	W. C. Long	W. C. Long	Elbert S Rule
Independent Oil & Gas Co.	Kansas City	5,000	S-C	2,000	Dubbs	J. W. Mitchell	See Oklahoma	See Oklahoma	See Oklahoma
Kanotex Refining Co.	Arkansas City	15,000	S-C	5,000	Jenkins	F. A. Deering[2]	W. L. Lesh		H. A. Schramm
National Refining Co.	Coffeyville	6,000	S-L	....		H. B. Setzler	See Ohio	See Ohio	
Peerless Oil & Refining Co.	Chanute	2,500	S-C	2,000	Jenkins	Reuben Werlin	F. E. Reinhardt	G. S. Reinhardt	Jess E. Wood
Shell Petroleum Corp.	Arkansas City	20,000	T-C	9,000	Dubbs	R. C. Roberts	See Illinois	See Illinois	See Illinois
Sinclair Refining Co.	Coffeyville	10,000	S-C-L	10,000	Isom	B. J. Healy			See Indiana
Sinclair Refining Co.	Kansas City	8,000	S-C	10,000	Isom	George Bibbington			See Indiana
Skelly Oil Co.	Eldorado	23,000	S-C	12,000	Jenkins and Pipe Stills	K. J. Smith	G. A. R. Slocum	W. T. Atkins	H. A. Miller
Standard Oil Co. of Kansas	Neodesha	15,000	S-A	12,000	Burton, Holmes-Manley	E. A. Metcalf[4]	E. A. Warren		W. H. Hill
Vickers Pet. Co. of Delaware	Potwin	3,000	S-C	1,500	Dubbs	A. M. Schrepfer	Myers Gross		H. G. Shaw
White Eagle Oil & Ref. Co.	Augusta	10,000	S-C	7,000	White Eagle	C. C. Durkee	H. L. McReynolds	C. L. Jolliffe	W. C. Etzbach

[1]A. M. Burton, chief engineer; L. J. Catlin, chief chemist.
[2]R. D. Mering, vice president.
[6]E. C. Moriarity, vice president; J. T. Stone, chief engineer; F. W. McCurry, chief chemist.

KENTUCKY

Aetna Oil Service, Inc.	Louisville	2,000	S-C	400	Fleming	A. T. Judy	H. J. Flanders	Julius Malkemus	
Ashland Refining Co.	Leach	4,000	S-C	1,000	Dubbs	Fred W. Irwin	E. F. Wells		R. W. Grossenbach
Glasgow Oil & Refining Co.	Glasgow	400	S	....					
Latonia Refining Co.	Latonia	8,000	S-C	2,500	Tube and Tank	E. A. Brown	See Ohio	See Ohio	See Ohio
Louisville Refining Co., Inc.	Louisville	4,000	S-C	1,800	Dubbs	C. A. Jouett	H. R. Smith		
Standard Oil Co. of Ky.	Louisville	5,000	S-C	3,000	Burton	A. K. Whitelaw	W. E. Smith	W. G. Violette	J. W. Bell
Stoll Oil Refining Co.	Louisville	1,500	L-W	....		Jack Kittner	Berry V. Stoll	Charles E. Stoll	William A. Stoll
The Texas Company	Pryse	2,000	S-C	2,000	Holmes-Manley	P. T. Williams	See Texas	See Texas	See Texas

[3]Latonia Refining Corp. is operated by the Standard Oil Co. of Ohio as a 100 per cent owned subsidiary. See Ohio.
[4]Paul G. Blazer, first vice president and general manager.
[5]Plant shut down for repairs February 1.

LOUISIANA

Bayou State Refining Co.	Hosston	6000	L	....		Jack Knox[1]	R. M. Elder	Frank M. Cook	J. F. Knox
Chalmette Petroleum Corp.	Chalmette	4,000	T	....		E. J. Mary	Louis Abramson	Louis Abramson	J. V. Gaudet
Crystal Oil Refining Corp.	Shreveport	10,000	S-C	3,000	Jenkins	H. H. Knoch[2]	R. E. Bishop	W. T. Leeper	A. J. Ahlum
Dartois Oil Refinery	Shreveport	80	L	....		Peter J. Dartois			
Dixie Oil Co., Inc.	Superior	3,000	S-C	2,000	Cross	F. O. Prior	A. M. McCorkle		R. B. Rice
Louisiana Oil Refining Corp.	Gas Center	21,200	A-C	13,000	Tube and Tank	W. F. Dickerson	C. M. Lamson	A. L. Edsell	F. T. Reed
Mexican Petroleum Corp.	Destrehan	32,000	A	....		F. W. Grey	C. F. Hatmaker	C. F. Hatmaker	H. A. Harley
Shell Petroleum Corp.	Sellers	15,000	S-C	10,000	Dubbs	P. E. Foster	See Illinois	See Illinois	See Illinois
Shreveport-El Dorado P.L.Co.	Shreveport	10,000	S-C	3,000	Dubbs-Jenkins	D. H. Christman	R. R. Brinkman	J. F. Atkins	M. W. Bass
Standard Oil Co. of La.	Baton Rouge	100,000	Comp.	65,000	Cross, Link, Tube and Tank	L. Link	T. H. Taylor	J. V. Gresham	W. N. Cottrell
The Texas Company	Shreveport	6,500	T	....		R. H. Donaldson	See Texas	See Texas	See Texas

[7]William Green, Harold Walker, J. S. Wood, T. S. Cooke, C. F. Hatmaker, vice presidents.
[8]J. B. Atkins, W. H. Cunningham, vice presidents; E. A. Meagher, chief engineer; H. O. Sivess, chief chemist.
[9]C. O. Scholder, C. I. Fiero, J. A. Bechtold, A. Clark Bedford, vice presidents; W. A. Gotschall, chief engineer; F. C. Read, chief chemist.

MARYLAND

Continental Oil Co. (Del.)	Baltimore	10,000	S-C	2,000	Dubbs	J. W. Brown	See Oklahoma	See Oklahoma	See Oklahoma
Mexican Petroleum Corp.	Baltimore	12,000	A	....		W. W. Hulin	See Louisiana	See Louisiana	See Louisiana
Standard Oil of N. J.	Baltimore	32,000	Comp.	43,597	Tube and Tank	J. F. Ewing			See New Jersey

MASSACHUSETTS

Beacon Oil Co.	Everett	27,000	S-C-A	25,000	Tube and Tank	D. L. Ferguson			W. C. Kendrick
Cities Service Refining Co.	East Braintree	15,000	S-L-C	3,050	Doherty, Holmes-Manley	D. P. Sturges	J. A. Kelley	T. J. Spellman	C. L. Boyle

MICHIGAN

Henry H. Cross Co.	Muskegon	1,000	S	....		W. W. Smedley			See Arkansas
Michigan Central Ref. Co.	N. Muskegon	2,000	S	....		R. B. Hovis	T. F. Caldwell	T. F. Caldwell	
Old Dutch Refining Co.	Muskegon	3,000	S	....		E. G. Guy	E. L. Hughes		
White Star Refining Co.	Trenton	6,000	S-C	3,600	Dubbs	A. F. Zoll	H. A. Coffin	L. R. Hunter	H. M. Sullivan
Standard Oil Co. of Indiana	Zilwaukee	1,500	S	....		W. A. Hutchison	See Indiana	See Indiana	See Indiana

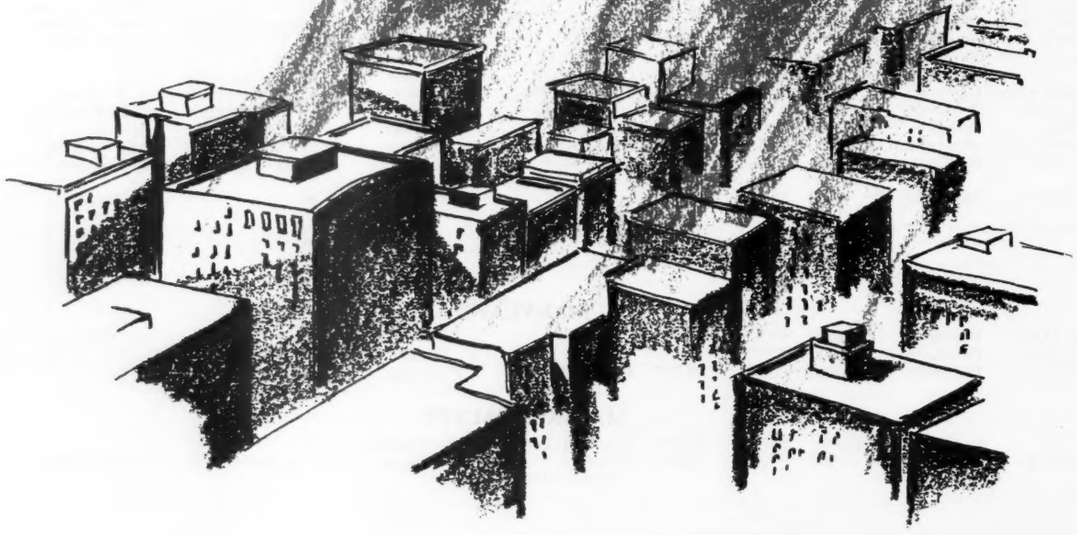
MISSOURI

Standard Oil Co. of Indiana	Sugar Creek	14,500	S-C	15,000	Sugar Creek	G. H. Moffett	See Indiana	See Indiana	See Indiana

MONTANA

Arro Oil & Refining Co.	W. Lewistown	2,000	S-C	500	Dubbs	Paul Jones	T. R. Gilmour		Ed L. Allen
Associated Gas & Oil Co.	Butte	750	T	....		Douglas Lewis[1]	John O'Brien	John O'Brien	
Big West Oil Co.	Kevin	1,200	S	....		Amed Soderstrom	L. R. Hawley	Amed Soderstrom	Amed Soderstrom
Conrad Refining Co.	Conrad	750	S	....		Philip W. Smith			
Hart Refineries	Missoula	300	S	....		J. H. Lilly[2]			
Hart Refineries	Hedgesville	100	S	....		G. A. Sorbo			
Laurel Oil & Gas Co.	Laurel	5,000	C	1,500	Donnelly		Frank T. Johnston	Frank T. Johnston	
Lewistown Oil & Ref. Co.	S. Lewistown	2,100	S	....		B. J. Manley			
Russell Oil Co.	Billings	2,000	T	....		Mike Hoyem	G. W. Russell, Jr.*	G. W. Russell, Jr.	
Russell Oil Co.	Butte	1,000	T	....			See above	See above	
Shelby Pipe Line & Ref.	Shelby	1,500	S	....		W. H. Gannon			P. R. Mac Hale
Snow Cap Oil Co.	Sunburst	350	T	....		B. A. Eulberg			Adam J. Eulberg

The Chicago Fire



BE SQUARE To Your Motor

BARNSDALL

Refineries: BARNSDALL OKMULGEE WICHITA *Sales Offices:* TULSA

1860

1930

conflagration of 1871

11 years

after the founding of the World's *first* Refinery

by William Barnsdall

On October 8th and 9th, 1871 occurred the memorable fire which reduced the greater part of the city of Chicago to ashes, destroyed its entire business center and swept over an area of three square miles, causing a loss of about $190,000,000. Nearly 20,000 buildings were consumed and 200 lives were lost.

***Eleven years before,* in 1860, exactly 70 years ago William Barnsdall, father of the founder of BARNSDALL, established at Oil Creek the *World's First Oil Refinery,* and he and his associate William Abbott drilled the second oil well. Thus the name of Barnsdall extends back to the very beginning of the Petroleum Industry.**

Today Barnsdall customers number millions of motorists who appreciate the joy of driving with such products as *Super-Gas* ETHYL the motor fuel of luxurious performance, BE SQUARE Gasoline, and the *Triple Filtered Paraffin Base* motor oils, made to withstand hundreds of miles of high speed driving, lubricating and protecting, adding years to motor life.

The World's FIRST Refiner

CHICAGO NEW YORK ST. LOUIS KANSAS CITY ST. PAUL LOS ANGELES

Survey of Operating Refineries in United States

Personnel and Plant Data

MONTANA (Continued)

Name and general offices—	President	Vice president	Secretary	Treasurer
Sunburst Oil & Refining Co., 415 Strain Bldg., Great Falls	L. C. Stevenson	G. C. Stevenson[4]	Homer G. Murphy	A. B. Gillespie
The Texas Company (Delaware), Houston, Tex.	See Texas	See Texas	See Texas	See Texas
Toole County Refining Co., Oilmont	F. E. Peterson	Edwin Knudson	J. A. Coons*	J. A. Coons
Yale Oil Corp., Drawer 60, Miles City	L. B. Hancock	P. N. Fortin*	P. N. Fortin	L. B. Hancock
Yale Oil Corp., Drawer 60, Miles City	See above	See above	See above	See above

*General manager.
[1]A. W. Anderson, chief engineer; Douglas Lewis, chief chemist.
[2]Howard Donlan, chief chemist.
[3]W. A. Manion, general manager.

NEW MEXICO

Continental Oil Co. (Delaware), Ponca City, Okla.	See Oklahoma	See Oklahoma	See Oklahoma	See Oklahoma
Continental Oil Co. (Delaware), Ponca City, Okla.	See Oklahoma	See Oklahoma	See Oklahoma	See Oklahoma
Gilliland Oil Co. of New Mexico, P.O. Box 2065, Tulsa, Okla.	Fred Phillips[1]	W. M. Irish III	D. W. Johnson	D. W. Johnson
Valley Refining Co., Box 660, Roswell	J. F. Campion*	S. W. Lodewick	S. P. Johnson, Jr.	S. P. Johnson, Jr.

*General manager.
[1]J. T. Boucher, general manager.

NEW JERSEY

Barber Asphalt Co., 1600 Arch St., Philadelphia, Pa.	A. W. Sewall	C. W. Bayliss[1]	E R. Riter	Frank J. Robertson
Crew-Levick Co., 400 N. Broad St., Philadelphia, Pa.	See Pennsylvania	See Pennsylvania	See Pennsylvania	See Pennsylvania
Gulf Refining Co., Frick Annex Bldg., Pittsburgh, Pa.	See Texas	See Texas	See Texas	See Texas
Standard Oil Co. of New Jersey, 26 Broadway, New York, N. Y.	Charles G. Black	Geo. W. McKnight[2]	Charles T. White	R. P. Resor
Standard Oil Co. of New Jersey, 26 Broadway, New York, N. Y.	See above	See above	See above	See above
Standard Oil Co. of New Jersey, 26 Broadway, New York, N. Y.	See above	See above	See above	See above
Tide Water Oil Co., 11 Broadway, New York, N. Y.	Axtell J. Byles	Robert McKelvy[4]	F. I. Fallon	F. A. Marsellus
Vacuum Oil Co., 61 Broadway, New York, N. Y.	Charles E. Arnott	C. E. Bedford[5]	G. V. Holton	Herbert Baker
Warner Quinlan, 2 Park Ave., New York, N. Y.	W. W. McFarland	Frank Frankel[6]	George Frankel	George Frankel

[1]Frank Seamans, vice president.
[2]Cracking plant operated by Bertrin Petroleum Co.
[3]C. G. Sheffield, Richardson Pratt, vice presidents.
[4]Noel Robinson, Edward L. Shea, vice presidents.

NEW YORK

Sinclair Refining Co., 45 Nassau St., New York	See Indiana	See Indiana	See Indiana	See Indiana
Standard Oil Co. of New York, 26 Broadway, New York	Charles F. Meyer[1]	Howard E. Cole	Howard A. Wilkinson	Richard P. Tinsley
Standard Oil Co. of New York, 26 Broadway, New York	See above	See above	See above	See above
Vacuum Oil Co., 61 Broadway, New York	See New Jersey	See New Jersey	See New Jerseyy	See New Jersey

[1]H. L. Pratt, chairman of board; Charles M. Higgins, Edwin R. Brown, Frederick S. Fales, Peter M. Speer, vice presidents; Dr. J. B. Rather, chief chemist.

OKLAHOMA

Anderson-Prichard Oil Corp., 711 Colcord Bldg., Oklahoma City	L. H. Prichard*	J. Steve Anderson	P. H. Anderson	P. H. Anderson
Barnsdall Refineries, Inc., Box 2091, Tulsa	E. B. Reeser	F. E. Holsten[1]	H. M. Edinger	H. M. Edinger
Barnsdall Refineries, Inc., Box 2091, Tulsa	See above	See above	See above	See above
Bell Oil & Gas Co., Kennedy Bldg., Tulsa	S. L. Lubell	Mark Finston*	Albert Finston	Albert Finston
Champlin Refining Co., Enid	H. H. Champlin*	Fred C. Champlin	D. W. Cotton	D. W. Cotton
Citizens Refining Co., Seminole	George J. Ames*	P. R. Alphonso	Cloyes King	
Continental Oil Co. (Delaware), Ponca City	D. J. Moran	W. H. Ferguson[3]	W. W. Bruce	G. F. Smith
Continental Oil Co. (Delaware) Ponca City	See above	See above	See above	See above
Cushing Refining & Gasoline Co., Cushing	E. C. Mullendore	E. J. Blank	Rex H. Winget*	R. C. Jones
Cushing Refining & Gasoline Co., Cushing	See above	See above	See above	See above
Eason Oil Co., Third Floor Masonic Bldg., Enid	T. T. Eason*	L. D. Hinman	T. W. Eason	T. W. Eason
Empire Oil & Refining Co., Bartlesville (Tulsa Trust Bldg., Tulsa)	Henry L. Doherty	Herbert R. Straight[5]	C. E. Murray	R. L. Morton
Empire Oil & Refining Co., Bartlesville	See above	See above	See above	See above
Empire Oil & Refining Co., Bartlesville	See above	See above	See above	See above
Garber Refinery, Inc. and Omar Refining Co.,[26] Roberts Bldg., Tulsa	G. J. Taft	Roy R. Ayers*	Stanley D. Letcher	Stanley D. Letcher
Globe Oil & Refining Co., Blackwell	I. A. O'Shaughnessy*	F. L. Jehle	R. E. Everett	E. A. Lenz
Globe Oil & Refining Co. of Delaware, Blackwell	See above	See above	See above	See above
Homaokla Oil Co., Seventh Floor, Philcade Bldg., Tulsa	A. K. Swan	R. S. McFarland[9]	W. D. Forster	W. D. Forster
Illinois Oil Co., Twenty-fourth St., Rock Island, Ill.	Frank P. Welch*	J. W. Armstrong	Ray E. Edwards	Ray E. Edwards
Imperial Refining Co., P. O. Box 2011, Tulsa	W. B. Hassett	S. H. Fredericks[11]	W. E. N. Phillips	W. B. Hassett
Independent Oil & Gas Co., Philtower Bldg., Tulsa	R. C. Sharp	C. P. Dimit[12]	John E. Curran	R. M. Riggins
Johnson Oil Refining Co., 178 W. Adams St., Chicago, Ill.	I. H. Johnson	L. Ralph Johnson[13]	G. C. Lilly	G. C. Lilly
Mid-Continent Petroleum Corp., Cosden Bldg., Tulsa	Jacob France*	George O. Moody[25]	E. M. Rouzer	Charles Klein
Northwestern Refining Co., Blackwell	I. A. O'Shaughnessy*	F. L. Jehle	Helen Jehle	Helen Jehle
Peppers Gasoline Co., Enid	Charles C. Peppers*		H. H. Champlin	H. H. Champlin
Pierce Petroleum Corp., 1709 Locust St., St. Louis, Mo.	Edwin D. Levy	J. J. O'Brien	S. W. Everett	Edwin D. Levy
Producers & Refiners Corp., P. O. Box 449, Independence, Kans.	L. R. Crawford	John Fertig[15]*	A. W. Heinemann	O. O. Holmgren
Producers Oil Co., Tenth Floor, Thompson Bldg., Tulsa	George W. Snedden*	M. D. Sanford	G. A. McCulley	G. A. McCulley
Pure Oil Co., 35 E. Wacker Drive, Chicago, Ill.	Henry M. Dawes	C. B. Watson[16]	F. S. Heath	Rawleigh Warner
Pure Oil Co., 35 E. Wacker Drive, Chicago, Ill.	See above	See above	See above	See above
Rock Island Refining Co., Duncan	S. B. Simmons	R. H. Brown	O. A. Roberts	O. A. Roberts
Shaffer Oil & Refining Co., 424 S. Cheyenne Ave., Tulsa	John J. O'Brien	John L. Gray[18]*	W. R. Francisco	W. R. Francisco
Sinclair Refining Co., 45 Nassau St., New York, N. Y.	See Indiana	See Indiana	See Indiana	See Indiana
Sun Oil Co., Finance Bldg., Pittsburgh, Pa.	See Pennsylvania	See Pennsylvania	See Pennsylvania	See Pennsylvania
Texas Pacific Coal & Oil Co., Fort Worth National Bank Bldg., Fort Worth, Tex.	See Texas	See Texas	See Texas	See Texas
The Texas Company, Houston, Tex.	See Texas	See Texas	See Texas	See Texas
Tidal Refining Co., Philcade Bldg., Tulsa	Noel Robinson	C. R. Barton[19]*	D. W. Bell	D. W. Bell
Transcontinental Oil Co., 1302 Thompson Bldg., Tulsa	F. B. Parriott	J. C. Adams[24]	E. D. Robinson	E. D. Robinson
Transcontinental Oil Co., 1302 Thompson Bldg., Tulsa	See above	See above	See above	See above
Western Oil Corp., Thompson Bldg., Tulsa	J. F. Darby*	George W. Snedden	C. F. Lynde	C. F. Lynde
White Oak Refining Co., 1432 Hunt Bldg., Tulsa	Victor H. Smith	Louis W. Pratt	B. E. Conner	L. W. Pratt
Wilcox, H. F., Oil & Gas Co., Sixth and Denver, Tulsa	H. F. Wilcox	G. A. Dye[23]	L. J. Yarbrough	M. P. Appleby
Wirt Franklin Petroleum Corp., Ardmore	Wirt Franklin*	F. M. Porter[28]	Edward Galt	Edward Galt
Yale Oil Corp., Yale	L. B. Hancock	C. H. Gifford	F. B. Hancock	F. B. Hancock

*General manager.
†Jenkins low pressure unit now operated by Bilmont Refining Co.
[1]George D. Locke, vice president in charge of sales; E. O. Bartlett, vice president; E. R. Wiles, chief chemist.
[2]Floyd Wilmoth, chief engineer; Maxcine Japour, chief chemist.
[3]W. W. Bruce, E. J. Nicklos, Walter Miller, E. S. Karstedt, vice presidents; Ray Russell, chief engineer; A. Henrickson, chief chemist.
[4]J. H. Hutchinson, chief engineer.
[5]G. B. Lyon, chief chemist.
[6]Frank Coates, Harry D. Frueauff, F. C. Brown, vice presidents; P. M. Miskell, general manager, refining division; Clay Briggs, chief engineer; A. L. Davis, chief chemist.
[7]H. B. Myers, chief engineer; H. A. Helton, chief chemist.
[8]A. A. Gilbert, chief chemist.
[9]John E. Dickson, vice president.
[10]J. W. Armstrong, chief engineer; Doctor Homa, chief chemist.
[11]C. M. Alexander, general manager.
[12]O. L. Cordell, Gillette Hill, J. M. Wadsworth, vice presidents; I. W. Alcorn, chief engineer; H. W. Sullivan, chief chemist.

Survey of Operating Refineries in United States

Personnel and Plant Data

MONTANA (Continued)

Name of company—	Plant location	Daily crude capacity	Type plant	Daily crack. capacity	Type cracking unit	Plant superintendent	Sales managers—Tank car	Sales managers—Bulk and service station	Sales managers—Purchasing agent
Sunburst Oil & Ref. Co.	Great Falls	3,500	S	....		C. E. Anderson	B. G. Stevenson		
The Texas Company	Sunburst	4,500	S	....		W. R. Borough	See Texas	See Texas	See Texas
Toole County Refining Co.	Oilmont	500	S	....		([5])			
Yale Oil Corp.	Miles City	800	S	....		A. A. Whittier[6]	P. N. Fortin	W. P. McCracken	P. N. Fortin
Yale Oil Corp.	Billings	4,000	S	....		D. D. Gibson	See above	See above	See above

[4]C. E. Anderson, J. T. Stevenson, vice presidents; C. E. Anderson, chief engineer and chief chemist.

[5]C. A. Stewart, chief chemist.

[6]A. A. Whittier, chief engineer and chief chemist.

NEW MEXICO

Continental Oil Co.	Farmington	1,000	S	....		H. H. Kinnaird	See Oklahoma	See Oklahoma	See Oklahoma
Continental Oil Co.	Artesia	1,500	S	....		Charles Morgan	See Oklahoma	See Oklahoma	See Oklahoma
Gilliland Oil Co. of N. Mex.	Albuquerque	750	S	....		E. L. Rogers	J. V. Ryan		J. V. Ryan
Valley Refining Co.	Roswell	300	S	....					

NEW JERSEY

Barber Asphalt Co.	Maurer	5,000	A-C	2,500	Cross[7]	J. H. Weller	H. C. Hottel	H. C. Hottel	
Crew-Levick Co.	Petty Island	4,000	T	....		E. M. Keely	See Pennsylvania	See Pennsylvania	See Pennsylvania
Gulf Refining Co.	Bayonne	30,000	S-C	1,000	de Florez	H. V. Sanderson	See Texas	See Texas	See Texas
Standard Oil Co. of N. J.	Bayonne	88,000	Comp.	50,400	Modified Tube and Tank	S. J. Tydeman	C. G. Sheffield	C. G. Sheffield	
Standard Oil Co. of N. J.	Jersey City	17,000	L	....		Dr. M. R. Meacham	See above	See above	
Standard Oil Co. of N. J.	Linden	75,000	Comp.	110,600	Tube and Tank				
Tide Water Oil Co.	Bayonne	55,000	S-L-C	10,000	Tube and Tank	R. D. Rogers			
Vacuum Oil Co.	Paulsboro	20,000	Comp.	12,000	Cross-Ellis	C. J. Hamm			J. R. Taylor
Warner-Quinlan Co.	Warners	18,000	S-C	1,500	Dubbs	J. K. Giles	B. Frankel	B. Frankel	Samuel Secular

[7]G. P. Whaley, chairman of the board; C. E. Arnott, W. M. McGee, vice presidents; F. R. Baxter, chief chemist.

[8]Morris Frankel, Loris Ravicz, vice presidents; R. B. Gove, chief engineer; Frank Kessler, chief chemist.

NEW YORK

Sinclair Refining Co.	Wellsville	4,000	S-L	....					See Indiana
Standard Oil Co. of N. Y.	New York	19,000	Comp.	8,000	Cross	F. W. Hadley			R. W. Hamlet
Standard Oil Co. of N. Y.	Buffalo	5,000	Comp.	2,000	Cross	A. E. Esser			See above
Vacuum Oil Co.	Olean	7,500	Comp.	3,000	Cross and Ellis	E. H. Wright			See New Jersey

OKLAHOMA

Anderson-Prichard Oil Corp.	Cyril	5,000	S-C	1,500	Winkler-Koch	M. B. Burrus	C. H. Dresser	C. L. Mayhall	W. M. Sturges
Barnsdall Refineries, Inc.	Okmulgee	11,000	S-C	3,500	Cross	G. T. Granger			C. E. Good
Barnsdall Refineries, Inc.	Barnsdall	5,000	Comp.	4,000	Cross	V. R. Oakley			See above
Bell Oil & Gas Co.	Grandfield	4,500	S-C	1,500	Dubbs	Rex Young	Albert Finston		J. E. Caddieux
Champlin Refining Co.	Enid	16,000	S-L-C	4,000	Cross, Pipe Stills	E. J. Slater[9]	L. A. Snyder	A. H. Holland	L. E. Noble
Citizens Refining Co.	Seminole	400	S	....					
Continental Oil Co. (Del.)	Sapulpa	10,000	S-L-C	3,600	Cross	C. R. Tillman	L. R. Milne	L. R. Milne	W. H. O'Connor
Continental Oil Co.	Ponca City	30,000	Comp.	15,000	Dubbs-Cross		See above	See above	See above
Cushing Ref. & Gaso. Co.	Cushing	2,500	T	....		Floyd A. Davis[4]	E. O. Derrick		Rex H. Winget
Cushing Ref. & Gaso. Co.	Blackwell	1,500	S	....		J. H. Hutchinson	See above		See above
Eason Oil Co.	Enid	3,000	T-S-C	2,000	Jenkins	L. C. Florence[4]	R. H. Rowland	J. D. Montgomery	A. C. Hatton
Empire Oil & Refining Co.	Okmulgee	4,000	S-L-C-W	1,000	Doherty	Don V. Eells	O. J. Tuttle	C. A. Willis	G. A. Tompson
Empire Oil & Refining Co.	Ponca City	7,500	S-L-C-W	5,000	Dubbs-Doherty	R. R. Mills	See above	See above	See above
Empire Oil & Refining Co.	Cushing	5,000	S	....		O. E. Mann	See above	See above	See above
Garber Refinery, Inc.	Garber	4,000	S	....	(†)	H. L. Welton[7]	Sales handled by Omar Refining Co.[20]		H. L. Welton
Globe Oil & Refining Co.	Blackwell	8,000	S-C	4,000	Cross, Winkler-Koch	O. D. Gurley[9]	A. E. Landsittel		F. L. Jehle
Globe Oil & Refining Co.	Cushing	15,000	S-C	4,000	Jenkins	O. D. Gurley	See above		See above
Homaokla Oil Co.	Allen	1,800	S	....		R. L. Johnson	F. L. Martin		
Illinois Oil Co.	Cushing	5,000	S-C	2,000	Donnelly	P. J. Glover[10]	Ed Donnelly	John Ready	George Walker
Imperial Refining Co.	Ardmore	6,000	S-C	2,000	Dubbs	J. F. Reardon	J. B. Saunders		
Independent Oil & Gas Co.	Okmulgee	5,000	S-C-L	3,000	Dubbs	R. D. Evans	J. V. McCormick	H. E. Wormhoudt	M. L. Norris
Johnson Oil Refining Co.	Cleveland	8,000	S-C	3,000	Dubbs	W. J. Leenhouts	H. G. Plane	Grafton Houston	
Mid-Continent Pet. Corp.	Tulsa	40,000	Comp.	12,000	Koontz	Fred B. Koontz	R. W. McDowell	R. W. McDowell	George C. Pohler
Northwestern Ref. Co.	Tonkawa	3,500	S	....		O. D. Gurley	A. E. Landsittel		F. L. Jehle
Peppers Gasoline Co.	Covington	1,000	S	....		C. R. Williamson	([14])	([14])	
Pierce Petroleum Corp.	Sand Springs	8,000	T-C-L-W	4,000	Cross	C. R. McKay		George S. Norman	W. L. Weiss
Producers & Refiners Corp.	Tulsa	6,000	S-C	3,000	Dubbs	John Cutter	A. T. Smith	B. L. Meece	E. L. Chatfield
Producers Oil Co.	Bristow	2,000	S	....		C. H. Fox	I. H. Patton, Jr.	I. H. Patton, Jr.	M. D. Sanford
Pure Oil Co.	Ardmore	3,000	S-C	2,400	Dubbs	John Jeffrey	R. H. McElroy, Jr.	L. S. Wescott	G. L. Parsons
Pure Oil Co.	Muskogee	12,000	S-C-L-W	5,500	Cross-Gyro	G. A. McBride	See above	See above	See above
Rock Island Refining Co.	Duncan	4,000	S	....		Jack Rayburn[17]	E. J. Glover		L. E. Kincannon
Shaffer Oil & Refining Co.	Cushing	10,000	S-L-W	3,800	Dubbs	W. E. Moody	B. L. Majewski	B. L. Majewski	R. G. Martin
Sinclair Refining Co.	Muskogee	1,200	S-L	....					
Sun Oil Co.	Yale	5,000	S	....		C. B. Carter	See Pennsylvania	See Pennsylvania	See Pennsylvania
Texas Pacific Coal & Oil Co.	Wynnewood	3,500	S-C	1,000	Dubbs	H. H. Pratt	See Texas	See Texas	See Texas
The Texas Company	West Tulsa	14,000	S-C	15,000	Holmes-Manley	P. L. Drake	See Texas	See Texas	See Texas
Tidal Refining Co.	Drumright	15,000	T-C	6,000	Burton, Tube and Tank	R. S. Stanfield	J. W. Warner	J. W. Warner	P. W. Fenton
Transcontinental Oil Co.	Bristow	5,000	S-C	1,350	Slagter	W. M. Fraser	H. J. Scott	H. J. Scott	W. R. Brown
Transcontinental Oil Co.	Boynton	2,500	S-C-L-W	900	Slagter	J. R. Barrott	See above	See above	See above
Western Oil Corp.	Duncan	2,000	S	....		A. R. Stribling[22]	I. H. Patton, Jr.	I. H. Patton, Jr.	I. H. Patton, Jr.
White Oak Refining Co.	Allen	8,000	S-T-C-L	2,000	Jenkins	Gustav Staubb[23]	N. B. Randolph	Frank M. Starling[24]	Frank M. Starling
Wilcox, H. F., Oil & Gas Co.	Bristow	4,000	T-C	1,000	Dubbs	P. J. Tinkler	H. E. Baugert	H. E. Baugert	H. B. Ward
Wirt Franklin Pet. Corp.	Ardmore	4,000	S	....		A. M. Edmiston	C. A. Franklin	W. H. Gilbreath	F. M. Porter
Yale Oil Corp.	Yale	2,000	S	....		Willard Shaw	C. R. Ramsey		F. B. Hancock

[13]James J. Johnson, chairman of the board.

[14]Products sold through Champlin Refining Co.

[15]R. E. Wertz, vice president; A. B. Lort, chief chemist at Parco; Peter Vilkes, chief chemist at Tulsa.

[16]R. W. McIlvain, W. E. Hutton, L. S. Wescoat, N. H. Weber, vice presidents; D. E. Sullivan, chief engineer; R. C. Osterstrom, chief chemist.

[17]Clyde Moe, chief engineer and chief chemist.

[18]F. C. Gordon, R. J. Graf, L. B. Riddle, W. E. Moody, E. J. McKay, B. L. Majewski, vice presidents; R. G. Davis, chief engineer; B. Frichot, chief chemist.

[19]W. C. Franklin, vice president.

[20]P. L. Bergman, chief chemist.

[21]L. L. Strickler, chief chemist.

[22]F. H. Dunn, M. P. Appleby, vice presidents.

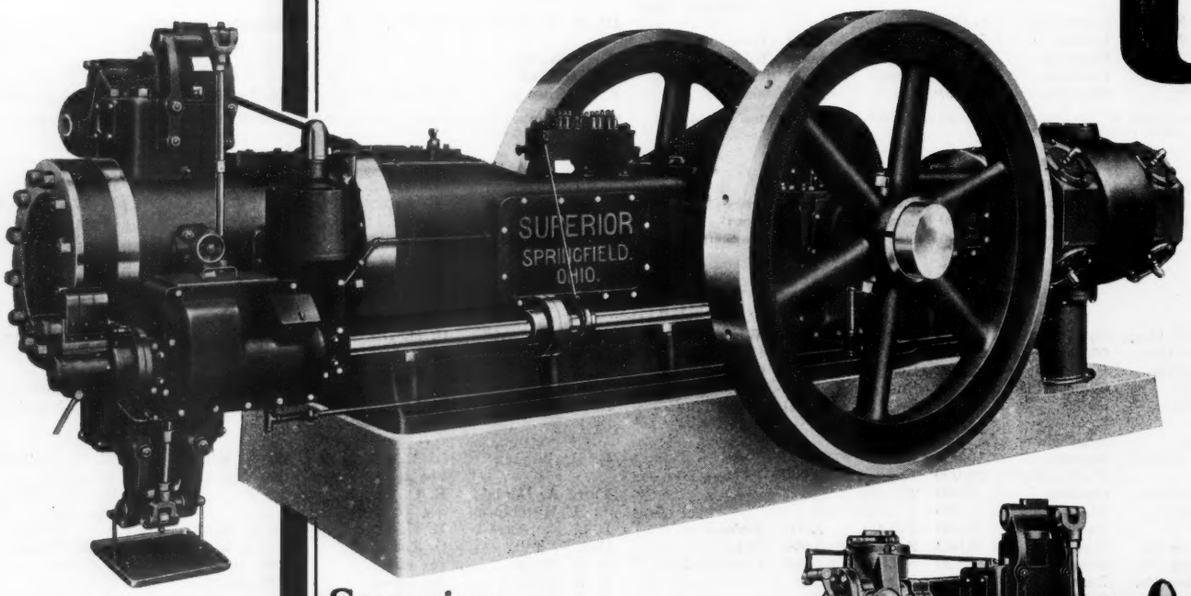
[23]Walter Gant, vice president; Hugh A. Neal, chief chemist.

[24]M. W. Bottomfield, J. M. Holliday, T. B. McCammon, vice presidents; A. J. Slagter, general superintendent of refineries.

[25]D. W. Moffitt, J. C. Denton, F. B. Koontz, vice presidents.

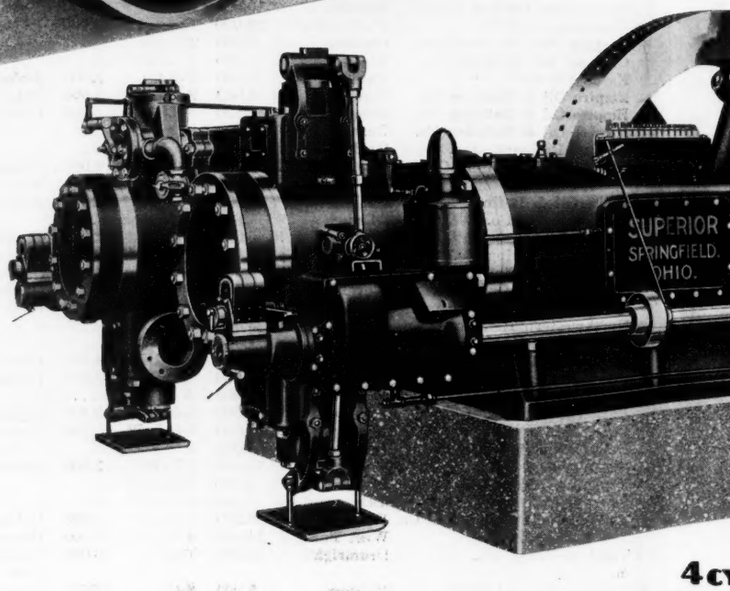
[26]Officers of Omar Refining Co. are P. S. Whitaker, president; J. H. Whitaker, vice president; A. S. Whitaker, secretary and treasurer.

Supe
COMPRE
UNI



Superior

4 CYCLE SINGLE CYLINDER DIRECT GAS ENGINE DRIVEN COMPRESSOR UNIT



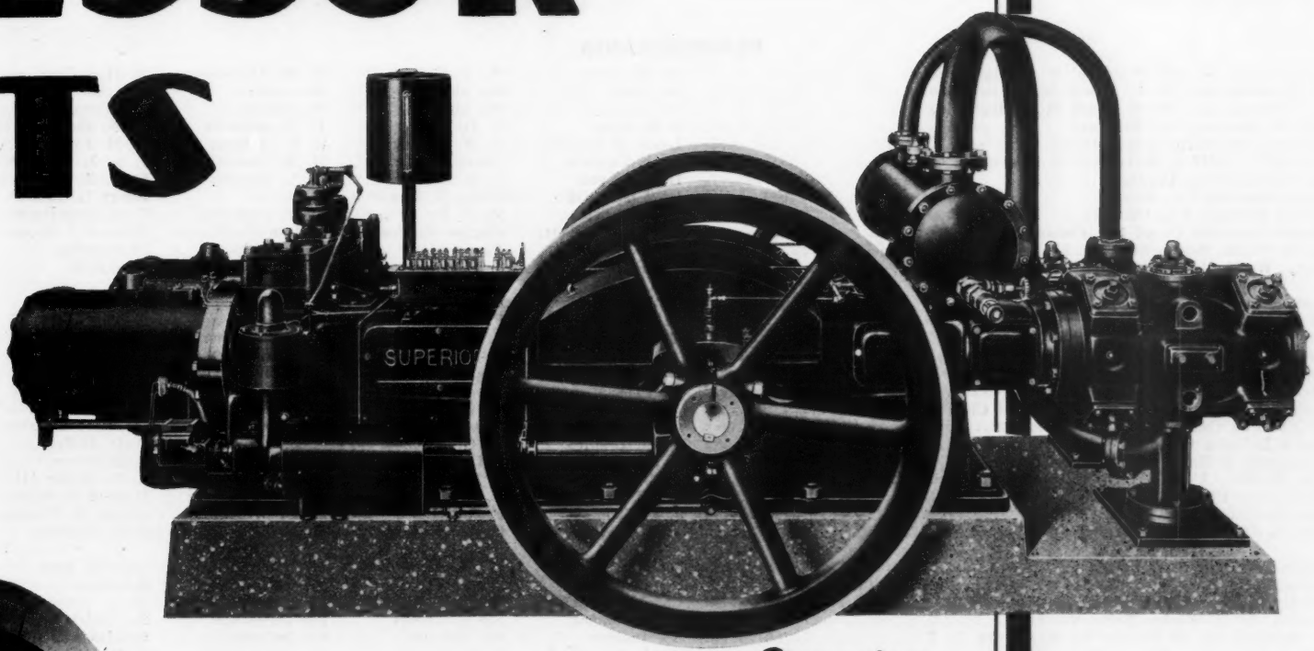
4 CY
ENG

THE
NATIONAL
COMPAN

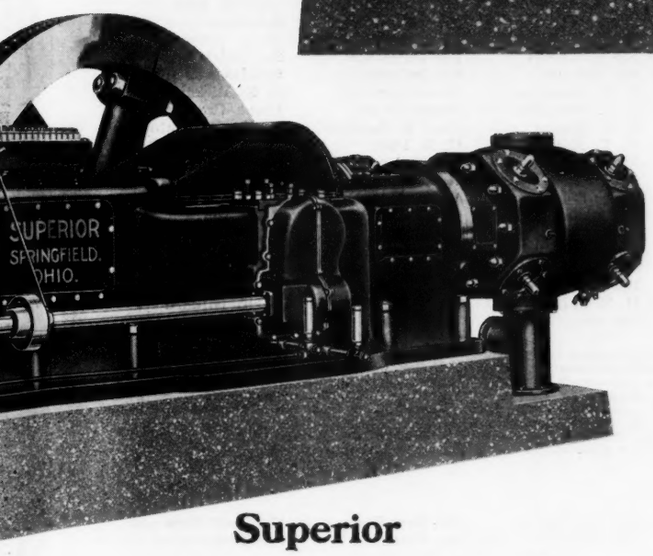
erior

RESSOR

NITS



Superior
2 cycle Twin Cylinder Direct Gas Engine Driven Compressor Unit



Superior
4 cycle Twin Cylinder Direct Gas Engine Driven Compressor Unit

THE
AL SUPPLY
IPANIES

Survey of Operating Refineries in United States

Personnel and Plant Data

OHIO

Name and general offices—	President	Vice president	Secretary	Treasurer
Allegheny-Arrow Oil Co., Canton	R. K. Shoolroy*	W. M. Thompson	D. F. McIntosh	J. C. McIntosh, Jr.
Canfield Oil Co., 3216 E. Fifty-fifth St., Cleveland	Louis Carruth	Charles McLean	H. M. Carruth	J. A. Jackson
Craig Oil Co., Weaver & Gleason Sts., Toledo	Pressly T. Craig	J. F. Minke*	George L. Craig, Jr.	Justin H. Bender
National Refining Co., 1404 E. Ninth St., Cleveland	F. B. Fretter	W. H. Lamprecht II[3]	J. D. Sadler	H. F. Heil
National Refining Co., 1404 E. Ninth St., Cleveland	See above	See above	See above	See above
Paragon Refining Co., Toledo	E. W. Edwards	H. W. Edwards[3]	C. J. Leroux	C. J. Leroux
Pure Oil Co., 35 E. Wacker Drive, Chicago, Ill.	See Oklahoma	See Oklahoma	See Oklahoma	See Oklahoma
Rajah Oil & Refining Co., 1930 Poland Ave., Youngstown	B. F. Simms*	Charles F. Smith	R. C. Miller	R. C. Miller
Solar Refining Co., P.O. Box 581, Lima	F. T. Cuthbert	J. R. Cuthbert[4] *	H. A. Graham	H. A. Graham
Standard Oil Co. of Ohio, East Ohio Gas Bldg., Cleveland	W. T. Holliday*	H. G. Jones[5]	F. H. Kelly	H. G. Jones
Standard Oil Co. of Ohio, East Ohio Gas Bldg., Cleveland	See above	See above	See above	See above
Sun Oil Co., Finance Bldg., Philadelphia, Pa.	See Pennsylvania	See Pennsylvania	See Pennsylvania	See Pennsylvania
Superoil Co., Toledo.	Robert R. Adams		C. L. Hopkins	C. L. Hopkins

*General manager.
[1]L. W. Hodous, chief chemist.
[2]John J. Gibbons, chief engineer; Henry C. Thatcher, chief chemist.
[3]John Edwards, vice president; W. M. Rees, chief chemist.

PENNSYLVANIA

Atlantic Refining Co., 260 S. Broad St., Philadelphia	W. M. Irish	W. P. Cutler[1]	W. M. O'Connor	R. H. Colley
Atlantic Refining Co., 260 S. Broad St., Philadelphia	See above	See above	See above	See above
Atlantic Refining Co., 260 S. Broad St., Philadelphia	See above	See above	See above	See above
Bradford Oil Refining Co., Bradford	J. H. Rose	F. D. Korner	H. G. Barcroft	H. G. Barcroft
Butler County Oil Refining Co., 145 E. Jefferson St., Butler	Lewis P. Litzinger	E. M. Litzinger[4]	C. R. Halleran	E. M. Litzinger
Canfield Oil Co., 3216 E. Fifty-fifth St., Cleveland, Ohio	Louis Carruth	Charles McLean	H. M. Carruth	J. A. Jackson
Carnegie Refining Co., Carnegie	H. A. Logan	F. G. Bannerot[5]	W. C. Heasley	F. G. Bannerot
Conewango Refining Co., Warren	Fred G. Clark	Harry R. Lewis		Harry R. Lewis*
Continental Refining Co., Oil City	A. F. Anderton	M. A. De Arman	J. W. Anderton	T. A. Anderton*
Crew-Levick Co., 400 Broad St., Philadelphia	Henry L. Doherty	Charles E. Foster*[6]	Walter W. Martin	Edward J. Hassa
Crystal Oil Works, Rouseville (J. A. Fawcett and E. V. Tilden)	Partnership	Partnership	Partnership	Partnership
Daugherty, W. H., & Son Refining Co., Petrolia	Dr. F. Sonneborn	S. B. Sonneborn[10]	R. G. Sonneborn	Max Pick
Emlenton Refining Co., Emlenton	P. J. Bayer	H. J. Crawford	T. B. Gregory	S. Messer
Empire Oil Works, Inc., Oil City	E. W. Chase*	Fred Fair	A. W. Scott	A. W. Scott
Franklin Creek Refining Corp., Franklin	Dr. F. Sonneborn	S. B. Sonneborn[11]	R. G. Sonneborn	Max Pick
Freedom Oil Works Co., Freedom		A. J. Minke[12]	C. E. McKee	C. E. McKee
Freedom Oil Works Co., Freedom		See above	See above	See above
Gulf Refining Co., Frick Annex Bldg., Pittsburgh	See Texas	See Texas	See Texas	See Texas
Independent Refining Co., N. Seneca St., Oil City	S. Messer	H. J. Crawford	P. S. Tarbox*	E. P. Theobold
Kendall Refining Co., Bradford, Pa.	Otto Koch*	Joseph H. Bovaird[12]	Howard H. Greene	Irvine H. Shearer
Levi Smith Refining Co., Railroad St., Clarendon	E. H. Beshlin	H. G. Eaton	C. D. Blair	C. D. Blair
McKean County Refining Co., Bradford	S. Messer	J. D. Berry	G. B. Hunter	C. D. Berry
Miller, A. D., Sons Co., 1801 Preble Ave., Pittsburgh	R. B. Miller	J. B. Miller*	O. B. Opsion	A. D. Miller III
Mutual Refining Co., Warren	W. F. Bennett	F. C. Eaton	A. W. Eaton	Herbert G. Eaton
Oil Creek Refining Co., Titusville	J. E. Fleming	P. J. McGraw	M. D. Woods	George F. Fleming
Pennsylvania Oil Products Refining Co., Warren	M. F. Cowden	George E. Muir	H. E. Lawrence	D. F. Cowden
Pennsylvania Refining Co., Butler	John A. Beck	Wayne K. Glenn[15]	Paul R. Beck	Paul R. Beck
Pennsylvania Refining Co., Butler	See above	See above	See above	See above
Pennzoil Co., Drake Theater Bldg., Oil City	Charles L. Suhr	Louis Walz[16]	D. J. Cavanaugh	M. A. Brewster
Pure Oil Co., 35 E. Wacker Drive, Chicago	See Oklahoma	See Oklahoma	See Oklahoma	See Oklahoma
Sinclair Refining Co., 45 Nassau St., New York, N. Y.	See Indiana	See Indiana	See Indiana	See Indiana
Starlight Refining Co., Karns City	W. J. Anderson*	M. P. Anderson	Zeno Henninger	C. E. Rickard
Sun Oil Co., Finance Bldg., Philadelphia	J. Howard Pew	J. N. Pew, Jr.	Frank Cross	Frank Cross
Superior Oil Works, Warren	Frank Morrison	F. C. Eaton	Fred B. Jackson	Herbert G. Eaton
Swan-Finch Refining Co., 205 E. Forty-second St., New York, N. Y.	W. G. Moncrieff	E. V. Moncrieff*	C. B. Dyer	E. V. Moncrieff
Texas Company, The, Houston	See Texas	See Texas	See Texas	See Texas
Tidioute Refining Co., Tidioute	E. W. Chase*	Fred Fair	R. W. Hawkey	A. W. Scott
Tiona Refining Co., 1136 Widener Bldg., Philadelphia	E. M. Lyons	C. A. Boler	William A. Powell	William A. Powell
Titusville Oil Works, Titusville	F. von Tacky	F. B. von Tacky*	C. L. von Tacky	E. F. von Tacky
United Refining Co., Warren	F. G. Bannerot	H. A. Logan*	H. W. Schmidt	H. A. Logan
Valvoline Oil Co., 165 Broadway, New York, N. Y.	W. Dixon Ellis	H. W. Nuckols*	C. C. Gould	C. C. Gould
Valvoline Oil Co., 165 Broadway, New York, N. Y.	See above	See above	See above	See above
Viking Oil Corp., Clarendon	L. C. Jamieson	R. W. Clark	R. W. Clark	L. C. Jamieson
Waverly Oil Works Co., Fifty-fourth St., Pittsburgh	T. J. Hilliard*	H. R. Hilliard[19]	J. E. Johnson	H. R. Hilliard
Waverly Oil Works Co., Fifty-fourth St., Pittsburgh	See above	See above	See above	See above

*General manager.
[1]J. W. Van Dyke, chairman of the board; R. D. Leonard, W. D. Anderson, E. R. Cox, M. O'Connor, vice presidents; W. Samans, chief engineer; Dr. J. B. Hill, chief chemist.
[2]R. D. Leonard, domestic sales manager; W. D. Anderson, export sales manager.
[3]Alfred Mullhaupt, chief engineer; Howard Salisbury, chief chemist.
[4]J. A. Beck, vice president; E. J. Ellenberger, chief engineer; Merle Cross, chief chemist.
[5]George L. Craft, vice president; E. C. Hawk, chief chemist.
[6]A. A. Gohn, chief engineer; R. S. Dawson, chief chemist.
[7]E. F. Hanna, chief chemist.
[8]Harry D. Frueauff, Andrew M. McBurney, vice presidents; J. W. Griswold, superintendent all refineries; E. C. Mackey, chief engineer; E. F. Burch, chief chemist.
[9]Cracking plant operated by Eastern Oil Processing Co., Petty Island, N. J.
[10]J. F. Roten, vice president; T. M. Murphy, general manager; Mr. Schoerke, chief engineer; Dr. F. W. Breth, chief chemist.
[11]C. H. Alsberg, general manager.
[12]Earle M. Craig, vice president; Fred L. Way, chief chemist.

RHODE ISLAND

Standard Oil Co. of New York, 26 Broadway, New York, N. Y.	See New York	See New York	See New York	See New York
Texas Company, The, Houston, Tex.	See Texas	See Texas	See Texas	See Texas

SOUTH CAROLINA

Standard Oil Co. of New Jersey, 26 Broadway, New York, N. Y.	See New Jersey	See New Jersey	See New Jersey	See New Jersey

TEXAS

American Refining Properties, Wichita Falls	(1)		F. F. Florence	F. F. Florence
Archer Refining Corp., City National Bldg., Wichita Falls	George Y. Golden*	W. C. Hamilton	W. H. Yeargin	W. H. Yeargin
Bell Oil & Gas Co., Kennedy Bldg., Tulsa, Okla.	S. L. Lubell	Mark Finston*	Albert Finston	Albert Finston
Big Spring Refining Co., Big Spring	R. S. Peterson	B. Rabinowitz	Charles R. Groff	Charles R. Groff
Bluebonnett Oil Refining Co., 1507 Magnolia Bldg., Dallas	B. L. Woolley		C. R. McClennahan	B. L. Woolley*
Burford Oil Co., 333 Tulsa Trust Bldg., Tulsa, Okla.	F. W. Burford*	John J. Thomas	E. F. Griswold	J. E. Woodworth
Central Texas Refining Co., Corsicana	L. A. Middleton*	John C. Calhoun[4]	Frank Lemon	I. N. Cerf
Central Texas Refining Co., Corsicana	See above	See above	See above	See above
Central Texas Refining Co., Corsicana	See above	See above	See above	See above
Central Texas Refining Co., Corsicana	See above	See above	See above	See above

Survey of Operating Refineries in United States

Personnel and Plant Data

OHIO

Name of company—	Plant location	Daily crude capacity	Type plant	Daily crack. capacity	Type cracking unit	Plant superintendent	Sales managers— Tank car	Bulk and service station	Purchasing agent
Allegheny-Arrow Oil Co.	Canton	1,200	S-C	1,200	Dubbs	M. S. Beringer		W. M. Thompson	J. C. McIntosh, Jr.
Canfield Oil Co.	Cleveland	1,000	L	....		S. L. Milliff[1]			M. C. Dippel
Craig Oil Co.	Toledo	2,000	S	....		John J. Gibbons[2]	J. H. Van Dersluys		J. F. Minke
National Refining Co.	Findlay	2,000	S-L	....		A. J. Rogers	Frank B. Fretter	Frank B. Fretter	
National Refining Co.	Marietta	580	S-L	....		F. Bergen	See above	See above	
Paragon Refining Co.	Toledo	8,000	S-C	3,000	Dubbs	C. W. Luton	John Edwards	P. E. Starkey	E. H. Shepherd
Pure Oil Co.	Heath	8,000	S-C	5,000	Cross and Gyro	R. D. McClaran	See Oklahoma	See Oklahoma	See Oklahoma
Rajah Oil & Refining Co.	Youngstown	500	S	....		J. C. Kuebler			
Solar Refining Co.	Lima	18,000	Comp.	10,000	Burton and Cross	J. M. Cory	E. L. Hughes		F. W. Engle
Standard Oil Co. of Ohio	Cleveland	16,000	Comp.	10,000	T. be and Tank	A. H. Buchanan	A. M. Maxwell	A. A. Stambaugh	C. A. Sherwood
Standard Oil Co. of Ohio	Toledo	12,000	Comp.	5,000	Tube and Tank	G. W. Hanneken	See above	See above	See above
Sun Oil Co.	Toledo	15,000	S-C	3,000	Various types	H. O. Cameron	See Pennsylvania	See Pennsylvania	See Pennsylvania
Superoil Co.	Toledo	200	L	....		J. J. Curran	T. E. Keen	T. E. Keen	T. E. Keen

[1]E. L. Hughes, vice president; W. F. Schanzlin, chief engineer; Frank Hawkins, chief chemist.

[2]G. A. Burke, J. S. Harrison, A. M. Maxwell, vice presidents.

PENNSYLVANIA

Atlantic Refining Co.	Philadelphia	50,000	Comp.	22,600	Lewis and Cross	H. M. Nichols	([2])	([2])	M. F. Roberts
Atlantic Refining Co.	Franklin	9,000	Comp.	6,000	Cross	G. E. Glines	See above	See above	See above
Atlantic Refining Co.	Pittsburgh	5,000	Comp.	4,000	Cross	G. H. Weaver	See above	See above	See above
Bradford Oil Refining Co.	Bradford	1,500	L	....		W. R. Peck[3]	James Lewis		
Butler County Oil Ref. Co.	Bruin	1,000	Comp.	1,100	Bruin	C. J. McCorry[4]	F. J. McCorry	C. R. Halleran	Marcus Stillwagon
Canfield Oil Co.	Coraopolis	1,000	L	....		R. W. Helm			M. C. Dippel
Carnegie Refining Co.	Carnegie	1,000	L	....		Robert Burr	J. Earl French		Robert Burr
Conewango Refining Co.	N. Warren	1,000	L-C	1,000	Bruin	W. L. Gettings[6]	D. C. Hughes		Tom Moore
Continental Refining Co.	Oil City	1,500	L	....		J. C. Vogan[7]	C. F. Felton	C. F. Felton	C. F. Felton
Crew-Levick Co.	Titusville	2,000	Comp.	1,500	Doherty[8]	Charles E. Kinder	Andrew H. Irelan	Andrew McBurney	Elmer D. Erney
Crystal Oil Works	Rouseville	1,000	S-L-W	....		W. B. Graham[21]	J. A. Fawcett	J. A. Fawcett	J. A. Fawcett
Daugherty, W. H., & Son Refining Co.	Petrolia	1,200	L	....					
Emlenton Refining Co.	Emlenton	1,500	S-C-L-W	....	Snodgrass	E. E. Ebner			
Empire Oil Works, Inc.	Reno	1,000	S-L-W	....		A. W. Cole	H. F. Krathge	H. F. Krathge	H. F. Krathge
Franklin Creek Refining Co.	Franklin	1,000	L	....		C. E. McElhiney			
Freedom Oil Works	Freedom	2,500	L-W	....		B. L. Heath	R. B. McKee	J. G. McCaw	George J. Mohr
Freedom Oil Works	Coraopolis	500	S-C	500	Dubbs	B. L. Heath	See above	See above	See above
Gulf Refining Co.	Philadelphia	40,000	T-C-L	8,000	Gulf	L. R. Jones	See Texas	See Texas	See Texas
Independent Refining Co.	Oil City	2,000	Comp.	400	Conerty	H. E. Shoemaker	P. S. Tarbox		C. R. Keniston
Kendall Refining Co.	Bradford	3,500	Comp.	1,200	Dubbs	Lon Crawford	Howard H. Greene	J. Bertram Fisher	J. Bertram Fisher
Levi Smith Refining Co.	Clarendon	200	L	....		Theo Mohr	C. D. Blair		
McKean County Refining Co.	Farmers Valley	1,200	L	....		Carl Anderson[20]	K. B. Ogilvie		P. J. Megivern, Jr.
Miller, A. D., Sons Co.	Pittsburgh	1,000	L-W	....		O. B. Opston[24]	J. B. Miller	E. R. Price	J. B. Miller
Mutual Refining Co.	Warren	750	S-L	1,100	Snodgrass	Charles H. Eaton[25]	W. L. Baumbach	W. L. Baumbach	Herbert G. Eaton
Oil Creek Refining Co.	Titusville	1,500	S-L-W	....		F. J. McGraw	M. D. Woods	M. D. Woods	C. L. Ehrhart
Pennsylvania Oil Products Refining Co.	Eldred	1,000	L-C	1,000	Conerty		H. S. Hayden	H. S. Hayden	
Pennsylvania Refining Co.	Karns City	2,000	L-W	....		Walter W. Beck[9]	Wayne K. Glenn	A. B. Weingard	Wayne K. Glenn
Pennsylvania Refining Co.	Titusville	1,200	S-L-C	400	Fleming	M. E. Kofford	See above	See above	See above
Pennzoil Co.	Rouseville	7,000	L-C-W	2,000	Dubbs	L. D. Fulton	D. J. Cavanaugh	R. A. Browne	
Pure Oil Co.	Marcus Hook	25,000	S-C-L-W	11,000	Cross and Gyro	E. A. McCadden	See Oklahoma	See Oklahoma	See Oklahoma
Sinclair Refining Co.	Marcus Hook	17,000	S-C	10,000	Isom	W. R. Argyle			See Indiana
Starlight Refining Co.	Karns City	150	S-L-W	....		C. E. Rickard	W. J. Anderson	W. J. Anderson	W. J. Anderson
Sun Oil Co.	Marcus Hook	35,000	Comp.	12,000	Cross	W. D. Mason	S. B. Eckert	S. B. Eckert	W. H. Booth
Superior Oil Works	Warren	500	S-L-W	....		H. F. Cogswell[22]	W. L. Baumbach	W. L. Baumbach	Herbert G. Eaton
Swan-Finch Refining Co.	Warren	1,000	L-W-C	250	Snodgrass	H. S. Peterson			
Texas Company, The	Marcus Hook	1,500	A	....		C. G. Cramer	See Texas	See Texas	See Texas
Tidioute Refining Co.[17]	Tidioute	800	L	....		A. W. Cole	H. F. Krathge	H. F. Krathge	E. W. Chase
Tiona Refining Co.	Clarendon	1,000	L-W	....		H. W. Walchli			
Titusville Oil Works	Titusville	1,000	S-C-L-W	200	Fleming	William Hartz	F. B. von Tacky	E. F. von Tacky	F. B. von Tacky
United Refining Co.	Warren	1,500	L-W	....		H. J. Miner[18]	H. A. Logan	H. W. Schmidt	
Valvoline Oil Co.	Warren	1,000	S-L-W	....		F. C. Eaton	H. W. Nuckols	W. L. Day	K. C. Wyckoff
Valvoline Oil Co.	East Butler	3,000	S-L-W	....		H. C. Eaton	See above	See above	See above
Viking Oil Corp.	Clarendon	1,000	L-W	....		George H. Seager			George H. Seager
Waverly Oil Works Co.	Corapolis	3,000	S-C	2,000	Cross	H. A. Trimmer.	L. L. Long	J. B. Fisher	W. T. Sieber
Waverly Oil Works Co.	Pittsburgh	1,000	S-C-L-W	1,000	Cross	J. A. Malone	See above	See above	See above

[3]Howard H. Greene, vice president; Irvine H. Shearer, sales manager, motor oil drums, S. M. Wolbert, chief engineer; Frank J. Philippbar, chief chemist.

[4]William Clowes, chief engineer; Robert Myers, chief chemist.

[5]A. B. Weingard, vice president.

[6]E. C. Breene, vice president; J. M. Hinman, chief engineer; W. A. Johnson, chief chemist.

[7]Owned and controlled by Empire Oil Works, Inc., Oil City, Pa.

[8]McLean Houston, production engineer; H. W. Wagner, chief chemist.

[9]D. W. Hovey, vice president. W. H. Millhiser, general superintendent of refineries. W. T. Sieber, chief chemist.

[20]W. H. Rockman, general manager and chief engineer. Franklin Bowley, chief chemist.

[21]Henry McFadden, chief engineer. Roy Toy, chief chemist.

[22]R. B. Allmendinger, chief chemist.

[25]Charles S. Moorhead, chief chemist.

RHODE ISLAND

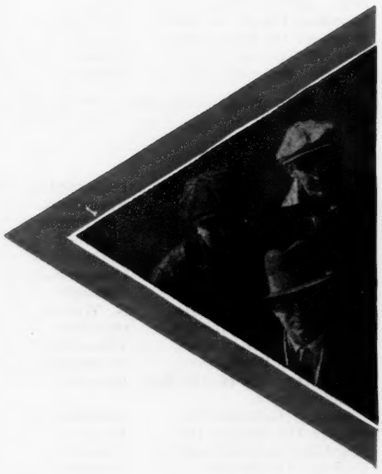
Standard Oil Co. of N. Y.	Providence	10,000	Comp.	6,000	Cross	C. W. Schaeffer			See New York
Texas Company, The	Providence	1,500	A	....		Thomas Wall	See Texas	See Texas	See Texas

SOUTH CAROLINA

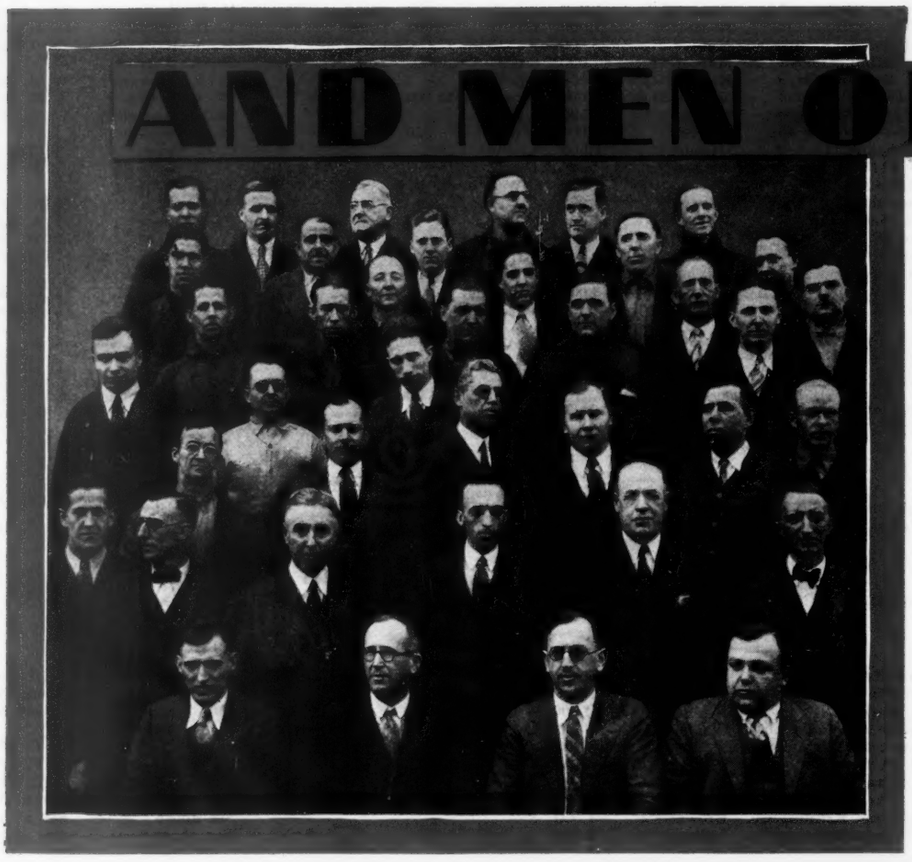
Standard Oil Co. of N. J.	Charleston	15,000	C-A	18,523	Tube and Tank	J. E. Lenhardt	See New Jersey	See New Jersey	See New Jersey

TEXAS

American Refining Prop.	Wichita Falls	5,000	S-C	3,000	Cross-Dubbs	D. F. Gerstenberger	W. L. Scott	Willard Johnson	H. W. Yenger
Archer Refining Corp.	Megargel	2,000	S	....		W. E. Hames	George Y. Golden		
Bell Oil & Gas Co.	Pampa	4,000	S	....			Albert Finston		J. E. Caddieux
Big Spring Refining Co.	Big Spring	3,500	S	..		H. O. Robertson			
Bluebonnett Oil Refining Co.	Wickett	5,000	T	....		J. T. Miller[3]	B. L. Woolley		
Burford Oil Co.	Pecos	6,000	S-C	5,000	Jenkins	John J. Thomas[3]	E. F. Griswold		E. V. Campbell
Central Texas Refining Co.	Angus	4,500	S	....		George P. Mann	C. T. Wolverton, Jr.	Joe E. Butler	
Central Texas Refining Co.	Minerva	2,500	S	....		See above	See above	See above	
Central Texas Refining Co.	Brownwood	1,500	S	....		See above	See above	See above	
Central Texas Refining Co.	Luling	2,000	S	....		See above	See above	See above	



MEN OF THE SIVYER



THE NUGENT SQUARE

JOIN FORCES

This month Sivyer and Nugent combine. The men who uphold the Sivyer Diamond and the men who rally to the Nugent Square have joined forces.

These men created the methods and metals that swung middle-western manufacturers to electric alloy steel castings—and brought their own companies such outstanding business volume that this consolidation is necessary.

The alloy business of each company has now grown to the point where it can no longer be handled in each foundry, in conjunction with carbon steels.

To the Sivyer and Nugent men this merger provides the specialized foundry unit now needed to handle their alloy casting volume and the specialized foundry unit now required for thin and variable-section carbon steel castings.

By so doing, it offers the American manufacturer the largest and most complete facilities for casting and heat treating small, variable-sections, and wear-defying parts in steel.

It also offers the most extensive research department in this division of the foundry industry.

the name of the new company will be . . . **SIVYER STEEL CASTING COMPANY**

MILWAUKEE *CHICAGO*

Survey of Operating Refineries in United States

Personnel and Plant Data

TEXAS (Continued)

Name and general offices—	President	Vice president	Secretary	Treasurer
Col-Tex Refining Co., 711 Colcord Bldg., Oklahoma City, Okla.	L. H. Prichard*	J. Steve Anderson	P. H. Anderson	P. H. Anderson
Cosden Oil Co., Electric Bldg., Fort Worth	J. S. Cosden	A. G. Reed	J. E. Whitney	J. E. Whitney
Continental Oil Co., Ponca City, Okla.	See Oklahoma	See Oklahoma	See Oklahoma	See Oklahoma
Crown Central Petroleum Corp., Houston	W. A. Williams	M. C. Ehlen	James T. B. Bowles	M. C. Ehlen
Dale Oil & Refining Co., 412 City National Bank Bldg., Wichita Falls	D. G. Gray*	Jack B. Dale[5]	J. D. Dale	J. D. Dale
Deepwater Oil Refineries, Inc., Houston	F. M. Law	L. F. Rothermel*	E. F. Harrell	E. S. Nevelle
Delrio Refining Co., Inc., Del Rio	J. D. Wrather*	J. R. Wrather[7]	John Wrather	John Wrather
Empire Oil & Refining Co., Bartlesville, Okla.	See Oklahoma	See Oklahoma	See Oklahoma	See Oklahoma
Falls Refining Co., Wichita Falls	H. W. Roberts, owner and general manager			
Grayburg Oil Co., Smith-Young Bldg., San Antonio	S. M. Newton	John W. Choate*	A. J. Devlin	A. J. Devlin
Great West Refining Co., Wichita Falls	Reese S. Allen*	J. W. Perry	G. T. West	J. C. Strause
Gulf Refining Co., Frick Annex Bldg., Pittsburgh, Pa.	G. R. Nutty	Charles B. Buerger[8]	W. J. Guthrie	J. E. Nelson
Gulf Refining Co., Frick Annex Bldg., Pittsburgh, Pa.	See above	See above	See above	See above
Gulf Refining Co., Frick Annex Bldg., Pittsburgh, Pa.	See above	See above	See above	See above
Houston Terminal Refining Co., 1019 Post Dispatch Bldg., Houston	Geo. L. H. Koehler*	A. E. Kerr	William Cleaves	Geo. L. H. Koehler
Humble Oil & Refining Co., Humble Bldg., Houston	W. S. Farish	H. C. Wiess[10]	F. O. Freese	R. L. Blaffer
Humble Oil & Refining Co., Humble Bldg., Houston	See above	See above	See above	See above
Humble Oil & Refining Co., Humble Bldg., Houston	See above	See above	See above	See above
Humble Oil & Refining Co., Humble Bldg., Houston	See above	See above	See above	See above
Humble Oil & Refining Co., Humble Bldg., Houston	See above	See above	See above	See above
Humble Oil & Refining Co., Humble Bldg., Houston	See above	See above	See above	See above
Humble Oil & Refining Co., Humble Bldg., Houston	See above	See above	See above	See above
Iowa Park Producing & Refining Co., 349 Harvey-Snider Bldg., Wichita Falls	J. F. Boyd	P. J. Gwynn*	J. D. Overby	Tom Corridon
La Salle Petroleum Co., 608 Wright Bldg., Tulsa, Okla.	John A. Prescott	W. J. Schnur*	W. J. Coppinger	W. E. Bennett
Macmillan Petroleum Corp., 530 W. Sixth St., Los Angeles, Calif.	R. S. Macmillan	Alfred Macmillan[11]	S. M. Batterson	S. M. Batterson
Magnolia Petroleum Co., Magnolia Bldg., Dallas	E. R. Brown	B. H. Stephens[12]	Courtenay Marshall	W. C. Proctor
Magnolia Petroleum Co., Magnolia Bldg., Dallas	See above	See above	See above	See above
Magnolia Petroleum Co., Magnolia Bldg., Dallas	See above	See above	See above	See above
Magnolia Petroleum Co., Magnolia Bldg., Dallas	See above	See above	See above	See above
Magnolia Petroleum Co., Magnolia Bldg., Dallas	See above	See above	See above	See above
Mid-Tex Refining Co., Midland	C. A. Middleton	E. E. Cranfill	Marian Church	Marian Church
Misko Refineries, Inc., Laredo	O. W. Killam*	W. T. Killam	J. O. Garnett	W. T. Killam
Motor Fuel Products Co., Esperson Bldg., Houston	S. P. Coblentz*	W. L. Moody III[14]	N. N. Oille	W. L. Moody III
Orient Petroleum Co., Wichita Falls	J. P. Howe			
Oriental Oil Co., 1911½ Pacific Ave., Dallas	W. R. Smith	F. M. Smith	D. G. White	F. M. Smith
Pampa Refining Co., Pampa	Reese S. Allen	A. McClory	G. L. Rowsey	A. McClory*
Panhandle Refining Co., Wichita Falls	Roy B. Jones	W. D. Brookover[15]	R. C. Stanford	M. A. Chambers
Pasotex Petroleum Co., 225 Bush St., San Francisco, Calif.	K. R. Kingsbury	R. J. Hanna[16]	J. H. Tuttle	R. C. Warner
Petroleum Refractionating Corp., P. O. Box 816, Pampa	Dan Danciger	Joe Danciger[17]	J. E. Vaeth	Joe Danciger
Phillips Petroleum Co., Phillips Bldg., Bartlesville, Okla.	Frank Phillips	John H. Kane[18]	O. K. Wing	O. K. Wing
Pioneer Oil & Refining Co., 604 Carolina, San Antonio	A. B. Slimp*	H. C. King, Jr.		M. L. Roark
Primrose Refining Co., Box 1455, Wichita Falls	H. D. Brin	S. E. Brin	E. Garonzik	
Primtex Refining Co., 513 Central Bank Bldg., Dallas	H. D. Brin	S. E. Brin		
Pure Oil Co., 35 E. Wacker Drive, Chicago, Ill.	See Oklahoma	See Oklahoma	See Oklahoma	See Oklahoma
Richardson Refining Co., 1603 Electric Bldg., Fort Worth	W. D. Richardson	Stanley Cosden	C. F. Dyckmans	C. F. Dyckmans
Rio Grande Oil Co., 417 S. Hill St., Los Angeles, Calif.	See California	See California	See California	See California
San Angelo Refining Co., P.O. Box 2011, Tulsa, Okla.	W. B. Hassett	G. W. Buckner	W. B. Hassett	R. D. Lavery
Shell Petroleum Corp., Shell Bldg., St. Louis, Mo.	See Illinois	See Illinois	See Illinois	See Illinois
Sims Oil Co., 1007 Magnolia Bldg., Dallas	Edward T. Moore*	F. R. Schneider[24]	L. W. Richards	D. H. Voss
Sinclair Refining Co., 45 Nassau St., New York, N. Y.	See Indiana	See Indiana	See Indiana	See Indiana
Star Refining & Producing Co., Fort Worth	W. M. Harrison*	Herman Gartner	Clara Mabry	Clara Mabry
Superior Refining Co., Ranger	J. M. Weaver	G. A. Clements*	H. H. Porter	H. R. Gholson
Sweetwater Oil & Refining Corp., Sweetwater	W. V. Thraves	C. H. Notting	J. A. Johnson	J. A. Johnson*
Taxman, J. J. & M., Refining Co., Wichita Falls	J. J. Taxman	Maynard Taxman	M. Taxman	M. Taxman
Texas Company, The (Delaware), Houston	R. C. Holmes	C. B. Ames[26]	E. M. Crone	C. E. Woodbridge
Texas Company, The (Delaware), Houston	See above	See above	See above	See above
Texas Company, The (Delaware), Houston	See above	See above	See above	See above
Texas Company, The (Delaware), Houston	See above	See above	See above	See above
Texas Company, The (Delaware), Houston	See above	See above	See above	See above
Texas Company, The (Delaware), Houston	See above	See above	See above	See above
Texas Company, The (Delaware), Houston	See above	See above	See above	See above
Texas Mexican Oil & Refining Co., P.O. Box 263, Laredo	M. T. Cogley	D. A. Tyng	G. B. Carden	G. B. Carden
Texas Pacific Coal & Oil Co., Fort Worth Bank Bldg., Fort Worth	E. J. Marston	E. R. Lederer	R. Seibel	R. Seibel
Texas Pacific Coal & Oil Co., Fort Worth Bank Bldg., Fort Worth	See above	See above	See above	See above
Texas Petroleum Co., 25th Floor, Smith-Young Tower, San Antonio	V. G. Schimmel	G. C. Shaw* [28]	C. L. Meserole	W. I. Lighthouse
Tidal Western Oil Corp., Philcade Bldg., Tulsa, Okla.	Noel Robinson	C. R. Barton* [29]	D. W. Bell	D. W. Bell
Tonkawa Petroleum Corp., Pyote	E. Constantin, Jr.	C. J. Constantin*	C. J. Constantin	C. J. Constantin
Transcontinental Oil Co., 1302 Thompson Bldg., Tulsa, Okla.	See Oklahoma	See Oklahoma	See Oklahoma	See Oklahoma
Waggoner Refining Co., Inc., Electra	W. T. Waggoner, Sr.	G. L. Waggoner	R. L. More	R. L. More
White Eagle Oil Corp., 1400 Federal Reserve Bank Bldg., Kansas City, Mo.[32]	See Kansas	See Kansas	See Kansas	See Kansas
Wickett Refining Co., P.O. Box 2011, Tulsa, Okla.	C. R. Armstrong	B. L. Woolley	B. L. Woolley	W. B. Hassett

*General Manager.
[1]Operated by creditors' committee: Fred W. Catterall, chairman; Frank Kell, vice chairman; J. C. Mytinger, general manager; E. H. Eddleman, manager oil and refining division; R. E. Goode, chief chemist.
[2]W. R. Grierson, chief chemist.
[3]John J. Thomas, chief engineer; A. C. Sturgis, chief chemist.
[4]Sherwood B. Owens, John H. Edwards, E. T. Green, vice presidents; John C. Calhoun, general sales manager; George P. Mann, chief engineer; Lester Landman, chief chemist.
[5]John E. Kilgore, vice president; George A. Jennings, chief engineer; R. G. Jones, chief chemist.
[6]J. S. Connelly, chief chemist.
[7]R. P. Humes, vice president.
[8]W. V. Hartmann, J. W. Williams, vice presidents.
[9]T. A. Murphy, chief chemist.
[10]James Anderson, R. L. Blaffer, J. S. Bonner, W. W. Fondren, W. E. Pratt, F. P. Sterling, vice presidents; J. L. Finley, general superintendent of refineries; E. Voss, chief engineer; W. R. Brison, chief chemist.
[11]W. B. Fisher, chief engineer; W. W. Watson, chief chemist.
[12]F. V. Faulkner, W. H. Francis, W. C. Proctor, A. C. Ebie, D. C. Stewart, E. E. Plumly, E. P. Angus, vice presidents; E. E. Plumly, manager of refineries.
[13]C. E. Cole, chief chemist.
[14]O. R. Seagraves, vice president; J. H. Howard, chief engineer.
[15]Subsidiary of Atlantic Pacific & Gulf Co., Federal Reserve Bldg., Kansas City, Mo.
[16]William F. De Haas, general manager; R. W. Jacobs, chief engineer and chief chemist.
[17]A. T. Fenley, chief chemist.
[18]M. A. Chambers, vice president; W. F. Sims, chief engineer refinery; F. Stauffer, chief engineer, production; V. U. Cloer, chief chemist.

UTAH

Diamond Oil Co., 304 Vermont Bldg., Salt Lake City	Dr. John T. White	J. W. Musser*	John Shewell	John Shewell
Utah Oil Refining Co., Seventh Floor, Newhouse Bldg., Salt Lake City	John C. Howard*	William R. Wallace	A. N. Johnson	A. N. Johnson

*General manager.
[1]Shut down. Expect to resume operations in April.

Survey of Operating Refineries in United States

Personnel and Plant Data

TEXAS (Continued)

Name of company—	Plant location	Daily crude capacity	Type plant	Daily crack. capacity	Type cracking unit	Plant superintendent	Sales managers: Tank car	Sales managers: Bulk and service station	Purchasing agent
Col-Tex Refining Co.	Colorado	10,000	S-C	2,000	Col-Tex	George H. Burruss	C. H. Dresser	C. L. Mayhall	
Cosden Oil Co.	Big Spring	12,000	S-C	10,000	Jenkins	Stanley Cosden[26]	R. N. Cline	F. L. Bunn	E. P. Brogdon
Continental Oil Co.	Wichita Falls	6,000	S-C	2,000	Dubbs	D. H. Hyler			
Crown Central Pet. Corp.	Houston	5,000	C-L	5,000	Holmes-Manley	L. Laferney	J. Stickel	J. Stickel	F. Sickert
Dale Oil & Refining Co.	Electra	4,000	S	....		George A. Jennings	D. G. Gray	J. D. Dale	D. G. Gray
Deepwater Oil Ref., Inc.	Houston	3,000	L	....		R. I. Traweek*	F. S. Rogers		John F. Painter
Delrio Refining Co., Inc	Del Rio	3,000	S	....		John Wrather	P. H. Hertzog		John Wrather
Empire Oil & Refining Co.	Gainesville	3,600	S-C	2,000	Dubbs	Curtis Bailey	See Oklahoma	See Oklahoma	See Oklahoma
Falls Refining Co.	Wichita Falls	2,500	S	....		T. P. Cannon	H. W. Roberts	H. W. Roberts	H. W. Roberts
Grayburg Oil Co.	San Antonio	5,000	S-C	1,200	Dubbs	Frank Hovell	Robert Rose	Robert Rose	A. C. Summers
Great West Refining Co.	Big Spring	7,500	S-C	1,500	Rowsey	G. L. Rowsey	R. G. Cocanower	R. G. Cocanower	G. L. Rowsey
Gulf Refining Co.	Port Arthur	125,000	T-C-L-W	52,000	Gulf and Holmes-Manley	W. A. Slater			
Gulf Refining Co.	Sweetwater	5,000	T-C	4,000	Gulf	B. H. Barnes			
Gulf Refining Co.	Fort Worth	6,000	T-C	4,000	Gulf	Herman Taylor			
Houston Terminal Ref. Co.	Houston	3,000	T-A	....		T. A. Murphy*	Frank Hermon		J. H. Crawford
Humble Oil & Refining Co.	Baytown	125,000	S-L-C	158,000	Cross and Tank and Tube	R. E. Powell	B. H. Brown	M. J. Monroe	J. M. Sitler
Humble Oil & Refining Co.	Ingleside	15,000	S-C	16,000	Tank and Tube	G. L. Farned	See above	See above	See above
Humble Oil & Refining Co.	McCamey	15,000	S-C	16,000	Tank and Tube	W. H. Barber	See above	See above	See above
Humble Oil & Refining Co.	San Antonio	4,500	S	....		C. M. Bell	See above	See above	See above
Humble Oil & Refining Co.	Chilton	4,500	T	....		C. M. Dennison	See above	See above	See above
Humble Oil & Refining Co.	Breckenridge	1,500	T	....		R. W. Way	See above	See above	See above
Humble Oil & Refining Co.	Neches	5,000	T	....		R. X. Cook	See above	See above	See above
Iowa Park Prod. & Ref. Co.	Iowa Park	2,500	S-C	1,250	Jenkins	L. R. Medford	P. F. Gwynn		
La Salle Petroleum Co.	Burkburnett	3,500	S-C	2,000	Jenkins	W. B. Fisher[11]	S. C. Cameron	S. C. Cameron	John E. Tanner
Macmillan Petroleum Corp.	Borger	6,000	S	....		H. E. Boner	Joseph Zeppa	D. R. Wilson	S. M. Batterson
Magnolia Petroleum Co.	Beaumont	55,000	Comp.	44,000	Burton, Cross	C. S. Dickens		E. P. Angus	E. R. Folmar
Magnolia Petroleum Co.	Magpetco	10,000	S	....		W. W. White		See above	See above
Magnolia Petroleum Co.	Luling	2,000	S	....		J. T. Dickens		See above	See above
Magnolia Petroleum Co.	Corsicana	3,000	S	....		W. C. Ralston		See above	See above
Magnolia Petroleum Co.	Fort Worth	5,000	S-C	3,000	Burton, Cross	John D. Ricker		See above	See above
Mid-Tex Refining Co.	Midland	2,500	S	....		M. G. Hickman	C. G. Wolverton		
Misko Refineries, Inc.	Mirando City	15,000	L	....		E. A. Johnson[13]	W. T. Killam		E. A. Johnson
Motor Fuel Products Co.	Laredo	2,500	S-C	1,500	Jenkins	A. H. Mayo	M. E. Blake		R. A. Reeder
Orient Petroleum Co.[15]	Wichita Falls	2,000	S	....		R. B. Williams[16]	F. F. Shotlander	R. L. Taylor	Herbert Wilson
Oriental Oil Co.	Dallas	3,500	S-L	....		F. M. Floyd[17]	B. H. Pitman	O. D. Martin	B. H. Pitman
Pampa Refining Co.	Pampa	3,000	S	....		A. L. Sanders[24]	Mac Kennedy		A. F. Clark
Panhandle Refining Co.	Wichita Falls	5,000	S-C	2,000	Dubbs	W. F. Sims	G. W. Reed	G. W. Reed	Roy J. Mann
Pasotex Petroleum Co.	El Paso	10,000	S	....					
Pet. Refractionating Corp.	Pampa	5,000	S-C	2,000		Mark Finston	Albert Finston		
Phillips Petroleum Co.	Borger	12,000	S	....		M. P. Youker	H. A. Trower	H. A. Trower	H. E. Koopman
Pioneer Oil & Refining Co.	Somerset	1,000	S	....		H. B. Slimp			
Primrose Refining Co.	Wichita Falls	2,500	S	....		C. J. Gibbs[21]	H. J. Strief*		H. J. Strief
Primtex Refining Co.	Grand Prairie	2,000	S	....		John Muense			
Pure Oil Co.	Smiths Bluff	32,000	S-C	21,000	Cross, Gyro	R. L. Vernor	See Oklahoma	See Oklahoma	See Oklahoma
Richardson Refining Co.	Big Spring	7,500	S-C	6,000	Jenkins	C. B. Faught[22]			Earl Brogdon
Rio Grande Oil Co.	El Paso	3,000	S	....		J. J. Downey	See California	See California	See California
San Angelo Refining Co.	San Angelo	1,500	S	....		S. E. Davis[20]	J. B. Saunders		
Shell Petroleum Corp.	Houston	20,000	T-C	10,000	Dubbs	R. B. High	See Illinois	See Illinois	See Illinois
Sims Oil Co.	Harrys	4,500	S-C	3,200	Cross	O. Mingus	F. R. Schneider	George D. Bowers	W. J. Morrison
Sinclair Refining Co.	Houston	23,000	S-L-C	20,000	Isom	J. W. Duckett			See Indiana
Star Refining & Prod. Co.	Fort Worth	1,500	S-C	200	Fleming	H. L. Pemberton	W. M. Harrison	Jack Ahlers	
Superior Refining Co.	Tiffin	2,000	S	..		J. W. Cash	G. A. Clements		J. H. Howlett
Sweetwater Oil & Ref. Co.	Sweetwater	2,000	S	....		J. F. Miller	J. A. Johnson	J. A. Johnson	J. A. Johnson
Taxman, J. J. & M., Ref. Co.	Wichita Falls	2,500	S-C	1,250	Smith Eng. Co.	H. T. Smart	Maynard Taxman		Maynard Taxman
Texas Company, The (Del.)	Port Arthur	60,000	Comp.	80,000	Holmes-Manley	W. K. Holmes	([27])	([27])	A. F. Colling
Texas Company, The (Del.)	Port Neches	20,000	A	....		F. S. Dengler	See above	See above	See above
Texas Company, The (Del.)	Houston	20,000	S-C	1,000	Tube and Tank	L. F. J. Wilking	See above	See above	See above
Texas Company, The (Del.)	West Dallas	16,000	S-C	3,600	Holmes-Manley	H. P. Parrigin	See above	See above	See above
Texas Company, The (Del.)	San Antonio	3,000	S-C	3,000	Holmes-Manley	H. A. Fouts	See above	See above	See above
Texas Company, The (Del.)	El Paso	1,500	S-C	1,500	Holmes-Manley	R. G. Collins	See above	See above	See above
Texas Company, The (Del.)	Amarillo	3,000	S-C	1,500	Pressure Coke	J. S. Warden	See above	See above	See above
Texas Mexican O. & R. Co.	Laredo	600	L	....		J. T. Ryan*	J. T. Ryan		J. T. Ryan
Texas Pacific Coal & Oil Co.	Fort Worth	3,000	S-L-C	900	Cross	George Pfau	F. D. Bostaph	M. Farnsworth	J. C. Davis
Texas Pacific Coal & Oil Co.	Caddo	1,000	S	....		R. Seibel	See above	See above	See above
Texas Petroleum Co.	Somerset	3,000	S	....		R. S. Peterson	Roy Wight	C. R. Weyel	T. L. Shaw
Tidal-Western Oil Corp.	Burkburnett	3,000	T	....		D. J. Carey	J. W. Warner[29]	J. W. Warner	P. W. Fenton
Tonkawa Petroleum Corp.	Pyote	5,000	S	....		H. J. Toups	W. L. Snoddy	W. L. Snoddy	H. J. Toups
Transcontinental Oil Co.	Fort Worth	5,000	S-L-C	1,350	Slagter	W. R. Sonricker	See Oklahoma	See Oklahoma	See Oklahoma
Waggoner Refining Co., Inc.	Electra	4,000	S	....		J. C. Hinds			C. F. Klop*
White Eagle Oil Corp.	Fort Worth	4,000	S-C	3,000	White Eagle	G. S. Dunham	See Kansas	See Kansas	See Kansas
Wickett Refining Co.	Wickett	2,500	S	....		O. H. Berryman	J. B. Saunders		

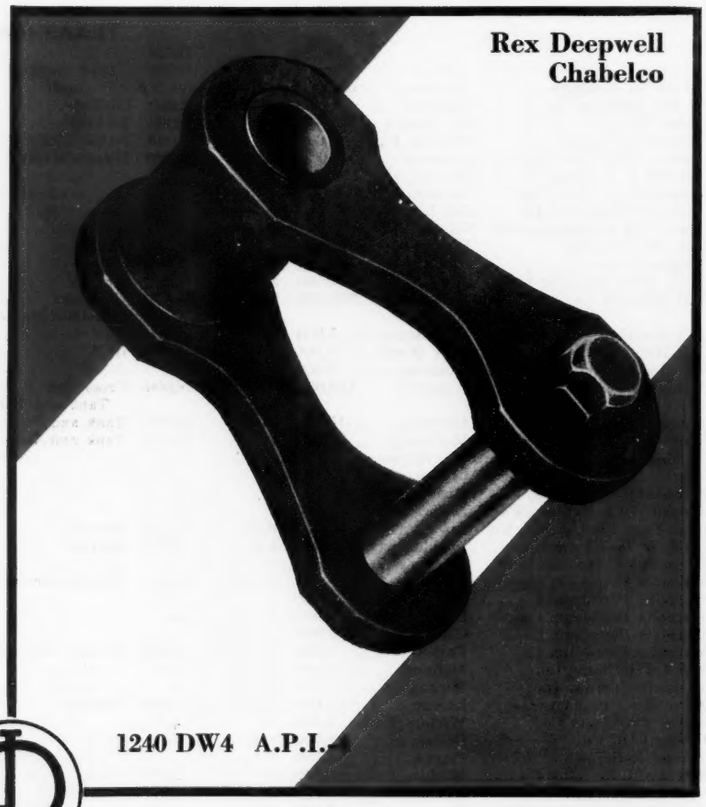
[19]H. M. Storey, H. T. Harper, H. D. Collier, vice presidents.
[20]Clyde Alexander, vice president and general manager; L. E. Phillips, W. N. Davis, H. E. Koopman, J. S. Dewar, P. J. McIntyre, J. M. Sands, vice presidents; A. H. Riney, chief engineer; G. G. Oberfell, chief chemist.
[21]Joe Keevil, chief chemist.
[22]W. C. Dunn, chief chemist.
[23]C. M. Alexander, general manager.
[24]W. L. Todd, vice president; Frank Gardner, chief engineer; H. L. Kerr, chief chemist.
[25]John F. Muense, chief chemist.
[26]F. T. Manley, vice president and manager refining department; T. J. Donoghue, G. L. Noble, R. Ogarrio, T. Rieber, W. S. S. Rodgers, vice presidents.
[27]Sales department—Domestic: W. S. S. Rodgers, H. W. Dodge, general sales manager; J. P. Gruet, manager northern territory; J. S. Leach, manager southern district. Foreign: T. Rieber.
[28]G. R. Schimmel, vice president; L. T. Kincaid, chief engineer; R. S. Peterson, chief chemist.
[29]W. F. Franklin, vice president.
[30]Sales handled by Tide Water Oil Sales Corp.
[31]H. R. Macmillan, M. P. Macmillan, vice presidents; C. C. Benz, chief engineer; S. E. Campbell, chief chemist.
[32]Plant operated by Magnolia Petroleum Co.
[33]O. E. Mitchell, La Rue Smith, vice presidents; H. H. Pruitt, chief engineer; E. W. Tublin, chief chemist.
[34]A. L. Sanders, chief engineer; J. G. Gant, chief chemist.
[35]Jack Danciger, vice president; Mark Finston, general manager.
[36]G. N. Moore is general manager of company; J. E. Davis, chief engineer; R. W. Henry, chief chemist.

UTAH

Diamond Oil Co.[1]	Virgin	500	T	....		J. W. Musser[2]			J. W. Musser
Utah Oil Refining Co.	Salt Lake City	6,000	Comp.	8,500	Modified Burton, Tube and Tank	Edward S. Holt[3]	M. J. Greenwood	M. J. Greenwood	W. H. Lovesy

[2]C. W. Buskirk, chief engineer.
[3]R. G. Clark, chief engineer; G. I. Kirby, chief chemist.

AN ANSWER TO EVERY CON



1240 DW4 A.P.I.-4

IN THE GREATEST CHAIN THAT EVER HIT THE OIL FIELDS

1030 DW3 A.P.I.-3

HIGH SPEED

Rex Deepwell Chabelco ground bushings and seamless alloy rollers give smooth action at high speeds.

VIBRATION

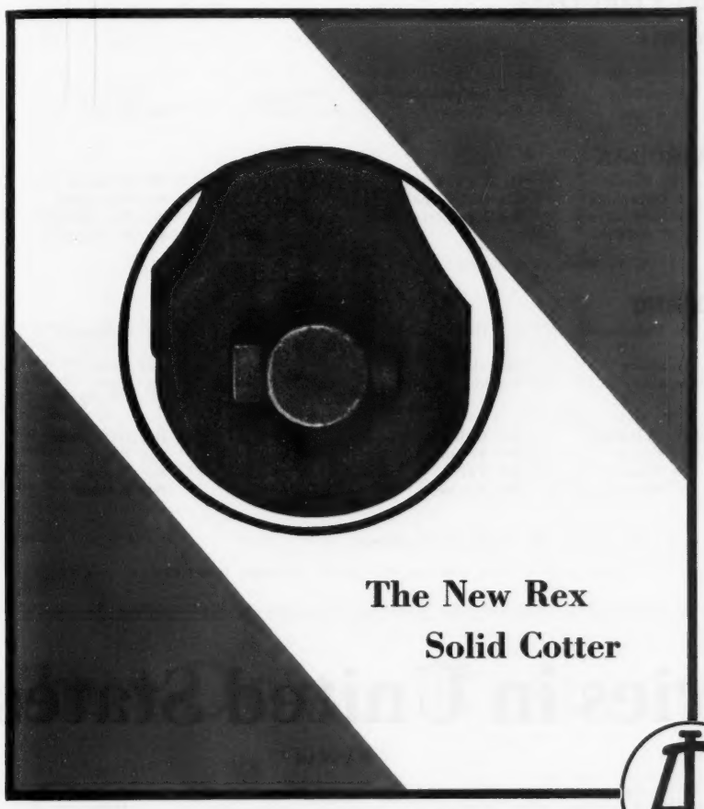
Uniform press fit of sidebars to bushings eliminates backing off of sidebars under vibration. The new Rex solid cotter, press fitted to the pin, stays in place.

The Greatest Chain that

REX Reg. U. S. Pat. Off. DEEPWELL CHABELCO

CONCRETE MIXERS ▲ PAVERS ▲ PLASTER MIXERS ▲ PUMPS ▲ SAW RIGS ▲ CHAIN ▲ SPROCKETS

DITION OF ROTARY DRILLING



The New Rex
Solid Cotter

STRENGTH

Alloy Sidebars
Nickel Alloy Pins
Seamless Bushings
Seamless Alloy Rollers

HARDNESS

Heat-Treated Sidebars
Case-Hardened Pins
Heat-Treated Rollers
Case-Hardened Bushings

PRECISION

Ground Pins
Ground Bushings
Close Tolerances
Broached Holes
Sidebars—Die Cut and Offset

The new REX SOLID COTTER—cannot Rock; cannot Break and stays in place—all combined into the UNIT LINK that Stays a Unit.

SUDDEN SHOCKS

The heat-treated sidebars and alloy pins stand sudden shocks without yielding.

HEAVY LOADS

The heat-treated sidebars stand the load and resist elongation.

The Rex Deepwell Chabelco 1030 DW3 is an A. P. I. No. 3 chain and the Rex Deepwell Chabelco 1240 DW4 is an A. P. I. No. 4.

The Identification
Mark of Rex
Chabelco

Ever Hit the Oil Fields

CHAIN BELT COMPANY, 719 Park Street, Milwaukee, Wisconsin
Cable Address: BELTCHAIN
1310 Second Nat'l Bank Bldg., Houston, Texas 1414 Santa Fe Ave., Los Angeles, Calif.

Stocks in all active Oil Fields

BUCKETS ▲ TRANSMISSION ▲ ELEVATORS ▲ CONVEYORS ▲ TRAVELING WATER SCREENS

Survey of Operating Refineries in United States

Personnel and Plant Data

VIRGINIA

Name and general offices—	President	Vice president	Secretary	Treasurer
Texas Company, The, (Delaware), Houston, Tex.	See Texas	See Texas	See Texas	See Texas

WEST VIRGINIA

Ohio Valley Refining Co., St. Marys	J. P. Flynn	H. J. Crawford	W. R. Reitz	W. R. Reitz
Pure Oil Co., 35 E. Wacker Drive, Chicago, Ill.	See Oklahoma	See Oklahoma	See Oklahoma	See Oklahoma
Standard Oil Co. of New Jersey, 26 Broadway, New York, N. Y.	See New Jersey	See New Jersey	See New Jersey	See New Jersey
Tri-State Refining Co., Kenova	G. C. Davison		W. B. Koontz	W. B. Koontz

[1]G. R. Dye, chief chemist. [2]W. D. Manz, chief chemist.

WYOMING

Continental Oil Co., (Delaware), Ponca City, Okla.	See Oklahoma	See Oklahoma	See Oklahoma	See Oklahoma
Midwest Refining Co., First National Bank Bldg., Denver, Colo.	(1)	(1)	(1)	(1)
Midwest Refining Co., First National Bank Bldg., Denver, Colo.	See above	See above	See above	See above
Midwest Refining Co., First National Bank Bldg., Denver, Colo.	See above	See above	See above	See above
Northwestern Petroleum Co., Box 491, Osage	(2)	(2)	(2)	(2)
Pedro Refinery, Newcastle	B. V. Hole, owner			
Producers & Refiners Corp., P. O. Box 449, Independence, Kans.	See Oklahoma	See Oklahoma	See Oklahoma	See Oklahoma
Texas Company, The, (Delaware), Houston, Tex.	See Texas	See Texas	See Texas	See Texas
Texas Company, The, (Delaware), Houston, Tex.	See Texas	See Texas	See Texas	See Texas
White Eagle Petroleum Corp., 1400 Federal Reserve Bank Bldg., Kansas City, Mo.	See Kansas	See Kansas	See Kansas	See Kansas
Wyoming Gas & Oil Co., Upton	C. F. Martins and W. K. Poulson, owners			

[1]All Midwest refineries are leased by the Standard Oil Co. of Indiana which also owns all the cracking units. See Indiana for personnel of Standard company.

[2]Operating under trustee management, Edward Stenger, Rapid City, S. Dak.

Shut Down Refineries in United States

ARIZONA

Company, plant location—	Daily cap. (bbls.)	Type of plant
Tucson Oil & Refining Co., Tucson	500	S

ARKANSAS

Home Refining Co., Camden	500	S
E. M. Tulle Refinery, El Dorado	1,000	S
Total	1,500	

CALIFORNIA

California Commercial Refining Co., Hynes	2,000	S
California Naphtha Products Co., Long Beach	1,000	S
Delaney Producing & Refining Co., Long Beach	3,000	S
East-West Refining Co., Los Angeles	1,000	T
Eureka Petroleum Corp., Los Angeles	5,000	S
Harbor Refining Co., Los Angeles	2,000	T
Hart Dearing Refining Co., Fellows	3,000	T
Holly Oil Co., Huntington Beach	3,000	T
Perfection Refining Co., Hynes	1,000	T
Pioneer Paper Co., Los Angeles, Vernon	700	A
Producers Refining Co., Kern River	500	L
Sentinel Oil Co., Los Angeles	1,000	S
Wilmington Petroleum Corp., Wilmington	500	L
Wilshire Oil Co., Fellows	2,500	S
Crescent Refining & Oil Co., Los Angeles	6,000	S
Italo American Petroleum Corp., Los Angeles	2,000	S
Associated Oil Co., Amorco	10,000	S
The Texas Company, Coalinga	1,000	S
Total	45,200	

COLORADO

Raven Oil & Refining Co., Rangely	200	S

ILLINOIS

Barber Asphalt Co., Madison	700	A
Interocean Refining Co., McCook	5,000	S&L
Total	5,700	

INDIANA

Portland Oil & Refining Co., Portland	600	S&C
Interstate Gasoline Co., East Chicago	2,500	S&C
Total	3,100	

IOWA

Omaha Refining Co., East Omaha	1,500	S&C

KANSAS

Company, plant location—	Daily cap. (bbls.)	Type of plant
Commonwealth Oil Refining Co., Moran	1,000	S
Chemical Oil & Gas Co., Osawatomie	1,000	S
Derby Oil Co. (Russell County Pipe Line Co.), Russell	2,500	S
Grant Oil Co., Augusta	2,500	S&C
Hutchinson Oil Refining Co., Hutchinson	2,500	S
Miller Petroleum Co., Humboldt	2,500	S&C
Red Bird Refining Co., Fredonia	200	S
Richardson Refining Co., Eldorado	1,500	S
Total	13,700	

KENTUCKY

Central Producing & Refining Co., Bowling Green	600	S
Great Southern Refining Co., Lexington	2,500	S&L
Neha Refining Co., Lexington	800	S
Total	3,900	

LOUISIANA

Alexandria Refining Co., Alexandria	600	S&C
Great Southern Refining Co., Ardis	2,000	S
Red River Refining Co., Crichton	1,800	S
Sinclair Refining Co. of Louisiana, Meraux	30,000	A
Southern Oil & Refining Co., Oil City	1,500	S
Total	35,900	

MARYLAND

Interocean Refining Co., Baltimore	7,000	S&C

MICHIGAN

Muskegon Refineries, Inc., Muskegon	500	S

MISSOURI

Interstate Rubber Producing Co., Kansas City	3,000	S&C
Wilhoit Refining Co., Joplin	2,000	S&C
Total	5,000	

MONTANA

American Refining Co., Great Falls	1,000	S
Montana Refining Co., Billings	750	S
Round Up Oil & Refining Co., Butte	200	S
Total	1,950	

Survey of Operating Refineries in United States

Personnel and Plant Data

VIRGINIA

Name of company—	Plant location	Daily crude capacity	Type plant	Daily crack. capacity	Type cracking unit	Plant superintendent	Sales managers— Tank car	Bulk and service station	Purchasing agent
Texas Co., The, (Delaware)	Norfolk	1,500	A	....		V. B. Peveto	See Texas	See Texas	See Texas

WEST VIRGINIA

Ohio Valley Refining Co.	St. Marys	2,000	Comp.	300	Snodgrass	J. B. Northrop[1]	A. M. Kiester	H. G. Triplett	
Pure Oil Co.	Cabin Creek	4,500	S-C-L	1,300	Gyro	J. R. Palmer	See Oklahoma	See Oklahoma	See Oklahoma
Standard Oil Co.	Parkersburg	5,000	C-A	9,129	Tube and Tank	G. W. Thompson			
Tri-State Refining Co.	Kenova	2,500	S-C	1,800	Jenkins	F. G. Brown[2]	W. H. Seltzer	W. B. Koontz	M. K. Lovell

WYOMING

Continental Oil Co. (Del.)	Glenrock	4,000	S-C	3,000	Burton	C. R. Tillman	See Oklahoma	See Oklahoma	See Oklahoma
Midwest Refining Co.	Casper	50,000	Comp.	30,000	Burton	M. G. Paulus			
Midwest Refining Co.	Greybull	10,000	S-A	15,000	Burton	B. L. Warren			
Midwest Refining Co.	Laramie	3,000	S-C	4,500	Burton	J. F. Cullen			
Northwestern Pet. Co.	Osage	300	S	....					
Pedro Refinery	Newcastle	500	L	....		Phil DeC. Hole			
Producers & Refiners Corp.	Parco	8,000	S-L-C	3,300	Dubbs	L. M. Johnston	See Oklahoma	See Oklahoma	See Oklahoma
Texas Co., The, (Delaware)	Casper	7,000	S-C	7,900	Holmes-Manley	R. E. Mossman	See Texas	See Texas	See Texas
Texas Co., The, (Delaware)	Cody	3,000	S-C	1,500	Holmes-Manley	P. Beall	See Texas	See Texas	See Texas
White Eagle Oil & Ref. Co.	Casper	6,000	S-C	6,000	Holmes-Manley Jenkins, White Eagle	J. W. Glass	See Kansas	See Kansas	See Kansas
Wyoming Gas & Oil Co.	Osage	100	S	....					

Shut Down Refineries in United States

NEW MEXICO

Company, plant location—	Daily cap. (bbls.)	Type of plant
Bloomfield Oil & Gas Co., Bloomfield	300	S
Colfax Refining Co., Colfax	500	S
Sullivan Refineries, Inc., Dayton	1,550	S
Tucson Oil & Refining Co., Tucson	500	S
Total	2,100	

OKLAHOMA

Canfield Refining Co., Yale	400	S&L
Caravan Refining Co., Oklahoma City†	3,000	S
Carter Oil Co., Cartoco	5,000	S
Chestnut & Smith Corp., Sand Springs	5,000	S
Coleman Nelson Corp., West Tulsa	1,500	S
Electrol Refining Co., Oklahoma City*	500	S
Gilmer Oil Co., Ringling	1,000	S
Inland Refining Co., Cushing	1,000	S
Interocean Refining Co., Bristow	4,000	S
Newkirk Oil & Refining Co., Newkirk	2,000	S
Oil State Refining Co., Enid	1,800	S
Pauline Refining Co., Hampton	1,200	S
Producers & Refiners Corp., Blackwell	3,000	S
Red Seal Refining Corp., Oklahoma City	2,000	S
Remington Oil Co., Wewoka	2,000	S
Santa Fe Oil & Refining Co., Ardmore	5,000	S
Sayre Oil & Refining Co., Sayre	500	S
Superior Oil Corp., Granfield	2,000	S
Walter Refining Co., Walters	2,500	S
Total	43,900	

*Operating experimental plant. †Being reconditioned for operation.

OHIO

Akron Oil Refining Co., Akron	750	S
Stellar Refining Co., Newark	2,000	S&C
Total	2,750	

PENNSYLVANIA

Beaver Refining Co., Washington	200	S
Chippewa Oil Co., West Bridgewater	300	L
Island Petroleum Co., Neville	1,000	L
North Penn Refining Co., Tiona	500	S&L
Warren Refining Co., Russell	300	S&L
Total	2,300	

TEXAS

Amarillo Producers & Refiners Corp., Pyote	3,000	S
American Oil Co., Pioneer	1,200	S

TEXAS (Continued)

Company, plant location—	Daily cap. (bbls.)	Type of plant
Boardman Oil Co., Wichita Falls	750	S
Bridgeport Refining Co., Bridgeport	800	S
Crystal Oil Corp., Burkburnett	1,000	S
De Leon Pipe Line & Refining Co., De Leon	1,500	S
Four States Refining Co., Texarkana	700	S
Freeport Asphalt Co., Freeport	5,000	T&A
Hagaman Refinery Corp., Ranger	2,000	S
Interstate Gasoline Co., Iowa Park	2,500	S
Interstate Refineries, Inc., Tiffin	2,000	S
Interstate Refineries, Inc., Ranger	2,000	S
Mexia Oil & Refining Co., Mexia	500	S
National Refining Co. of Texas, Greenville	2,000	S
Oriental Refining Co., Dallas	5,000	S
Paterson Oil Co., Brownwood	1,000	S
Pecos Valley Refining Co., Pyote	8,000	S
Petroleum Corp., Electra	1,500	S
Pierce Petroleum Corp., Fort Worth	8,000	S
Pierce Petroleum Corp., Texas City	5,000	S
Southwestern Refining Co., Sour Lake	1,000	L
South Bosque Refining Co., South Bosque	1,000	S
Superior Refining Co., Tiffin	2,000	S
Swastika Refining Co., Muenster	1,000	S
Tarrant Refining Co., Fort Worth	1,000	S
Texas Oil Products Co., Waxahachie	2,500	S
Valley Refining Co., Wichita Falls	2,500	S
Waco Refining & Pipe Line Co., East Waco	2,500	S
Yuba Oil Refining Co., Nacogdoches	100	S&L
Western Oil Corp., Wichita Falls	2,500	S
Total	68,550	

TENNESSEE

Gillespie Oil Corp., Gallatin	250	S
Nashville Oil Co., Nashville	500	S
Urania Petroleum Co., Ltd.	500	S
Total	1,250	

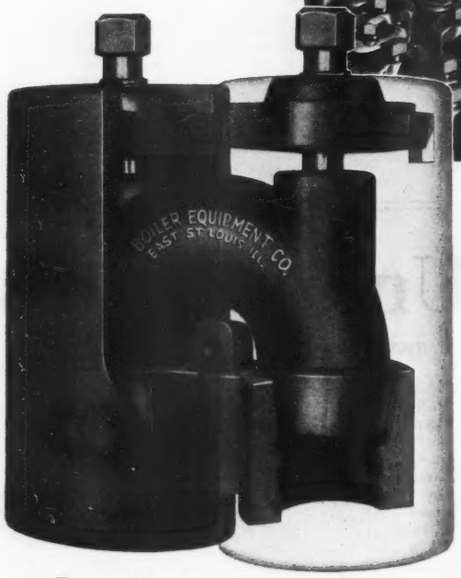
WASHINGTON

Spokane Oil & Refining Co., Hillyard	1,000	S
Inland Empire Refining Co., Parkwater	500	S
Total	1,500	

WYOMING

Alliance Oil & Refining Co., Thermopolis	1,500	S
Lovell Refinery, Lovell	600	S
Egaso Holding Corp., Osage	1,000	S
Total	3,100	

Key Refinery Fittings are shipped to the farthermost corners of the world—wherever refineries are anxious to operate economically and efficiently. Photograph shows part of Key Shipping Rooms.



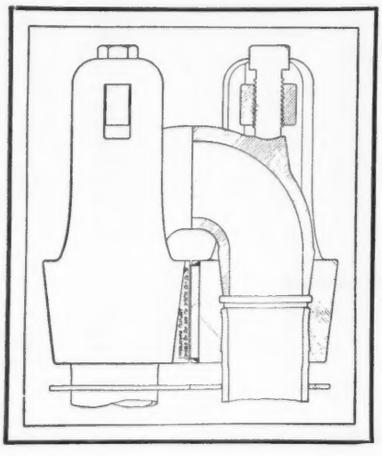
The special features of these fittings are protected by following Patent Applications: No. 304976, Sept. 10, 1928; No. 315274, Oct. 26, 1928; No. 387346, Aug. 21, 1929.

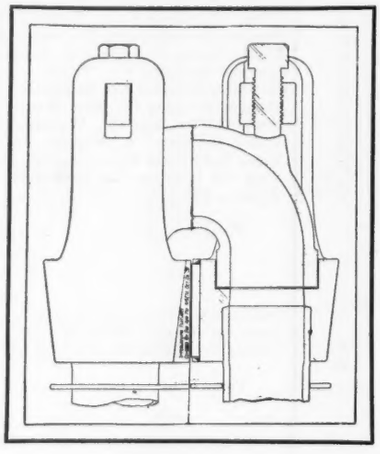
For Minimum Pressure Drop Through Coils—Use

KEY Sectional Type Stream Line Flow Fittings...

on all Types of Tube and Pipe Stills

DESIGNED to decrease pressure drop and consequently increase output, this newest Key Return Bend is proving extremely efficient—and decidedly economical. Being sectional and interchangeable, it saves the greatest possible amount of time in cleaning, stripping and heading up.





One of the outstanding features of this fitting is its big safety margin—it is engineered on a safety factor of ten.

Made of forged steel, except where fittings are for use on alloy tubing, when special alloy of same analysis as tubing is used. Illustration shows the internal construction of this fitting and its ruggedness. Replacement of single tubes is possible without the loss of other tubes.

In addition to this new fitting, the sectional fittings detailed to the left were specially designed for pressures up to 750 pounds, and permit very close spacing of tube centers.

Write for complete information on these newest Key Fittings.

KEY BOILER

EAST ST. LOUIS

KEY REFINERY FITTINGS

—Used since the early days of tube still construction

NOT only in the largest refineries of America, but in the world's largest refinery now operating—located in Curacao—in fact almost everywhere oil refineries are located, Key Fittings are in use.

Key Fittings have been in use since the early history of the first tube still construction. Through years of close contact with refinery engineers, we have designed many shapes, sizes and styles for varying operating pressures and temperatures. On this page are shown a few of the many types of fittings we manufacture.

For special problems and special operating conditions, our field service engineers are always available. If required, we will supervise the installation of fittings, the rolling of alloy or carbon tubing, and the instruction of operating forces in the most up-to-date method of stripping, cleaning and heading up.

Use Key Fittings—backed by Key Service—and enjoy a gratifying saving! Write for complete information.

K-2484
Return Bend

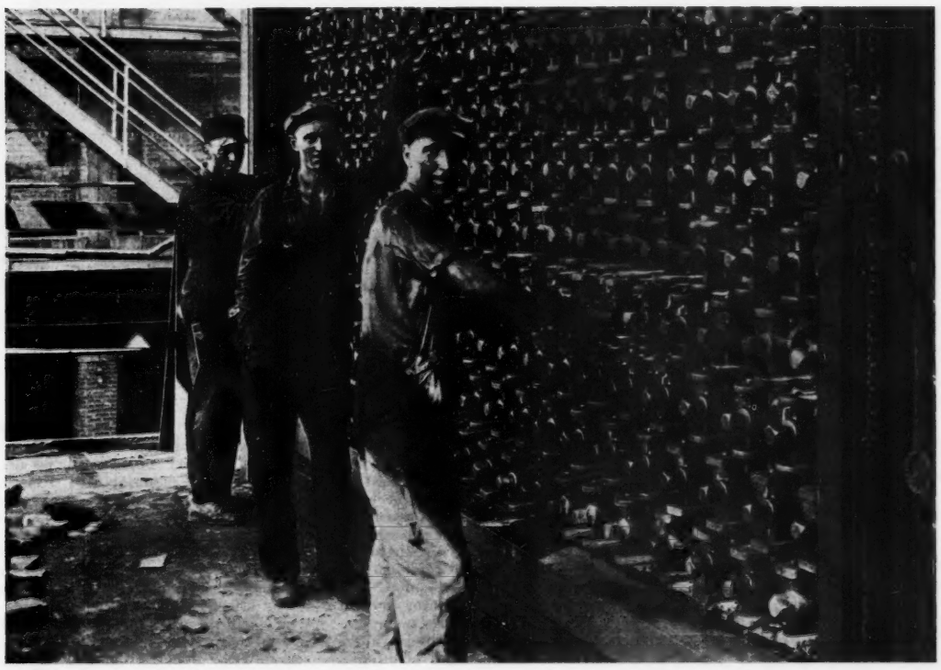
K-2494
Terminal Fitting with threaded outlet

K-1906
Return Bend

K-1845
Terminal Fitting with threaded outlet

K-2394
Cross Adapter Fittings substitute for Compound Plug used in Cross Fitting

K-2215
Tee Fitting with Reducing Flanges



K-2193
Adapter Fitting Substitute for Blind Flanges. Made in all sizes

Fittings at left are multiple tube type. They were installed in 1925 and have been giving satisfactory service ever since. One end of this still was headed up complete for test by three workmen in one and one-half hours.

EQUIPMENT CO.
ILLINOIS, U.S.A.

Acid Recovery Unit in Small Refinery

Plant Economically Constructed and Operated Handles 150 Tons of Recovered Acid Monthly. Operation Explained

By E. J. Mary
Refinery Superintendent, Chalmette Petroleum Corp.

An acid recovery plant is, in some instances, very necessary to a refiner and especially so, when the refining plant is situated in a populated district where the disposal of acid sludge and other refinery slops into community drainage canals is obnoxious to public interests and forbidden by law.

The refinery, at which this plant is operating, is in just such a locality. It is a small refining plant having a capacity of 5,000 bbls. per day when topping and cracking West Texas crude oil. When the use of acid became necessary at this plant, the disposal of the acid sludge became a correlary to the installation of other process facilities used in acid treating. This acid recovery plant was evolved and installed at this time and has since very adequately taken care of all the acid sludge formed in the processing of West Texas crude naphthas, pressure distillates and other products. The naphthas and gasolines especially, which are sometimes exported to foreign countries, are very heavily acid treated in order to meet European requirements for sulphurs and gums.

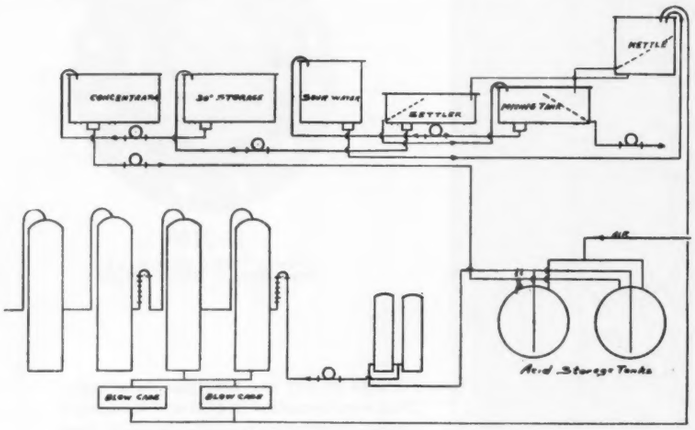
Recovery Plant

The recovery plant is shown diagrammatically in the Drawing "A." The sludge which is drawn off of the continuous treater towers and agitators is accumulated in the sludge blow cases and thence blown into the acid kettle. Sour water from the sour water tank is then added to this sludge until the acid which separates out is diluted to approximately 30° Baume. The whole mass is then heated with steam for about 12 hours and then allowed to settle. The acid is drawn off from a well in the bottom of this tank into an open trough which leads to the acid settler tank and the tar, skimmed from the top of the kettle by means of a swing line, is drawn into the mixing tank.

The separation of the tar and acid in the sludge is sometimes very difficult to obtain and it is therefore necessary that the operator exercise a great deal of care to see that the acid drawn off is of the proper concentration. Generally, the best separation is obtained when the acid is around 30° Baume but this varies and it is sometimes necessary to add water to dilute this acid or add more sludge to concentrate it. Some of the sludge treated gives a break immediately but on other occasions a batch which has apparently been collected from identical treating conditions and processes will require a very decidedly longer settling period for complete separation. This variability of the sludge is probably due to the severity of the acid treatment given to the gasoline, the time of contact period, degree of polymerization and other factors which are beyond the absolute control of the treating plant operators.

The tar which has been drawn from the kettle into the mixing tank is first washed with water and then heated and settled. The slightly acid water which separates out is pumped into the sour water tank and subsequently used in a following batch for diluting the acid which separates in the kettle, thus eliminating a waste of acid in the washings. A fresh low grade gas oil is then added to the mixer tank and mixed thoroughly with the tar. This mixture is washed again with fresh water and settled. When settling is complete, the wash water is again pumped into the sour water tank and the tar is pumped from a swing line into the boiler room fuel tanks for immediate consumption.

The acid which has been drawn off of the kettle into the settler tank is heated with steam until any remaining tar in the acid has been completely separated. The acid is then pumped into the 30 degree storage tank and the tar, as it is accumulated from one batch to another, is skimmed from the top and pumped into the mixing tank along with the tar from preceding batches and the gas oil. As the quantities of acid and sludge which are handled in this tank are proportionately very much smaller than those in the kettle, the relative time for separation is high and consequently the separation in this tank is much more complete than that obtained in the kettle.

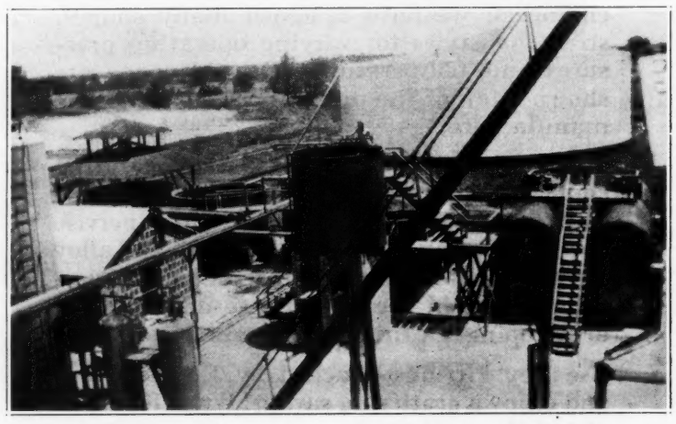


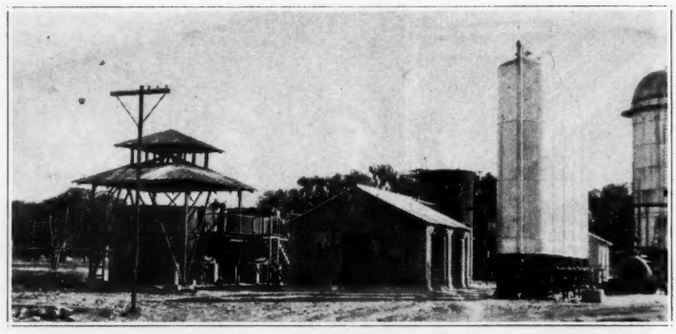
Flow chart of acid recovery plant for small refinery.

Concentrating Acid

When a sufficient quantity of acid has been accumulated in the 30 degree storage tank for concentrating purposes, a batch is pumped into the concentrator tank. In this tank, the acid is heated with high pressure steam and blown with air until sufficient water is evaporated off to make acid 60° Baume. This 60° Baume acid is then pumped into the storage tanks and blended there with fresh fuming acid to 66° Baume or 93.5 per cent H_2SO_4. This acid is now ready for treating purposes in the refining processes.

In this evaporation process, a foaming stage is reached when the acid has a density of around 52° Baume. At this stage the concentrator must be watched very closely in order to avoid a spill as the ebulition is very intense. Once this stage has been passed, however, the operator may proceed with the concentration without any very special attention. When the acid has reached 60° Baume it should very promptly be pumped into the closed storage tanks in order to guard against absorption of water from the atmosphere.





Views of acid recovery and treating plant at Chalmette, La., refinery of the Chalmette Petroleum Corp.

The concentrator tank is a 15 by 10-foot open top tank with a heavy lead lining throughout. The heating coils are arranged in seven spirals which rest on lead supports at the bottom of the tank. The air coil is simply a perforated coil of lead pipe which circumscribes the heating coils in a way to distribute the air equally over the entire tank bottom. The tank is provided with a canopy roof arranged with a large ventilator area at the very top so as to permit the unhampered egress of the water vapors which have a rather severe acid odor. This roof is constructed of wooden frame work covered with transite corrugated sheets.

The kettle is a 10 by 10-foot open top tank, also lead lined throughout. It is elevated 11 feet from ground level so as to allow withdrawal of acid and tar into other tanks by gravity and is provided with an open steam coil for heating purposes.

The remaining tanks are lead lined open top tanks without auxiliary equipment with the exception of the mixing tank which is provided with a steam coil and a mixing device for adequately mixing the acid tar and the gas oil. Also, the settling tank is equipped with a steam coil.

Plant Capacity

The plant was designed to have a capacity of approximately 100 tons of recovered acid per month but has recently been called upon to recover more than 150 tons per month and although it has reached its maximum capacity for handling sludge from West Texas crude oil naphthas, it is altogether possible that with a sludge of a different nature, its ultimate capacity might still be above this. The fuel manufactured from the acid tars, when mixed with gas oil, contains less than one-half of 1 per cent acid, has a high heating value and is in every way satisfactory. The acid manufactured is also very satisfactory and although it is a black acid, it is every bit as effective for treating purposes as fresh acid of the same strength. The cost of operations and maintenance are very low for a plant of this nature, one operator with the aid of one unskilled assistant being able to handle satisfactorily the acid treating plant and the recovery plant simultaneously. The maintenance over a period of nine months has averaged less than $100 per month.

The entire plant was designed by W. R. Simpson with the assistance of the refinery engineers. It is a flexible unit which, both adequately and economically dispenses with the deposition of sludge acid into refinery and community sewers.

a.c.f. Tank Cars

for the Petroleum Industries
2700 on order
in these four classes

Always Get a "Car Foundry" Quotation

American Car and Foundry Company

30 CHURCH ST., NEW YORK CHICAGO ST. LOUIS

a.c.f.

IN THE SERVICE OF THE NATION'S RAILWAYS, HIGHWAYS, WATERWAYS, INDUSTRIES

VALVES & FITTINGS *with a*

PROVED

record of strength and dependability

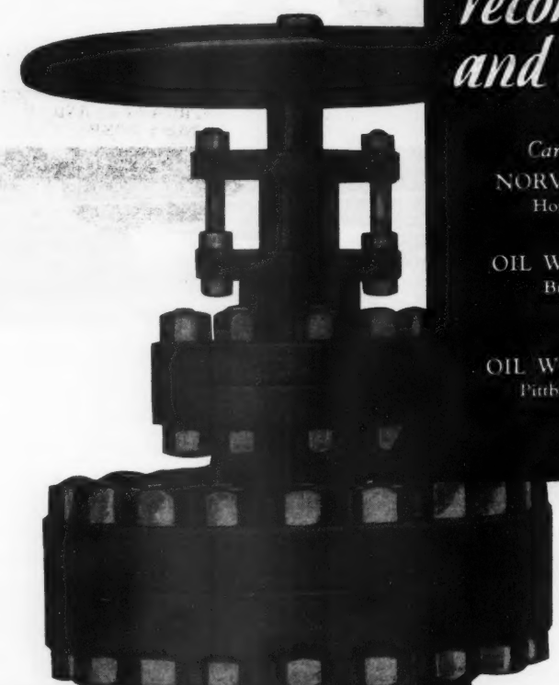
Carried in Stock and Sold by

NORVELL-WILDER COMPANY
Houston, Beaumont, Shreveport, Fort Worth

OIL WELL SUPPLY COMPANY
Branch Stores in all Oil Fields

Export Distributors

OIL WELL SUPPLY COMPANY
Pittburgh, New York, Tampico, London



KERO TEST
REGISTERED U. S. PAT. OFF.
PITTSBURGH

Electricity in Refinery Operation

In Use Exclusively at Phillips' Borger, Tex., Refinery. Unique Installation Assures Uninterrupted Service

By W. H. Creel
Phillips Petroleum Co.

Although the industrial world in general some time ago adopted the electric motor drive as the most economical and efficient prime mover, most refiners are still using steam as their main source of power.

Electric power has many advantages over steam, the more important of which are higher overall efficiency and lower transmission costs. In some cases the possibility of using both automatic and remote control is very important.

The chief objection to electric power around refineries has been dangers of interruption in power service, which causes considerable trouble and loss in plant operating efficiency. This is particularly true if the still charging pumps are motor driven. In some locations, the danger of fire from sparks caused by short circuits, switches, etc., is another objection which has to be overcome.

Because of the many advantages of electric power, the Phillips Petroleum Co. has constructed a 12,000-bbl. refinery in which electricity is the only source of power, a small steam generating plant being maintained for heating and cleaning purposes only. This plant is located at Borger, Tex., in the heart of the Panhandle Field. All pumps, including the fire pumps, air compressors, and other machinery are motor driven. However, the fire pumps, which are the multistage centrifugal type, have been equipped with dual drive—a steam turbine and an electric motor on opposing ends of the pump shaft. The motors connected to the fire pumps are so wired that they can be started or stopped at any one of three strategic points in the plant. Where advantageous, other motors have been equipped with remote control switches. All the still pumps are controlled from switchboards located in the control houses. A special type of variable speed motor, which is regulated by varying the position of the brushes and which has a constant speed for any setting, regardless of the load, and which is made by the General Electric Co., has been installed on the still charging pumps. The control switch, together with an electric tachometer, is installed in the central control house. This allows the operator to regulate the charge to the stills much more closely than would be possible with any other type of equipment and he is assured that the charge will not vary.

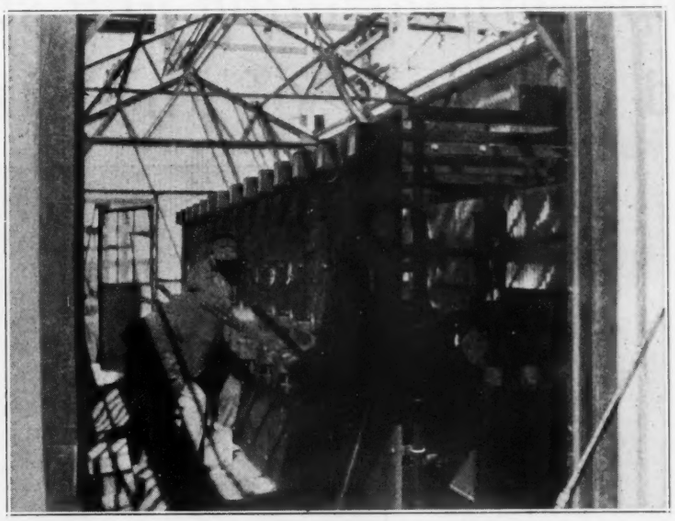
Eliminating Fire Hazard

To combat the fire hazard due to sparks caused by switches in treating plants, pump houses, etc., oil immersed circuit breakers and push button switches have been developed for and adapted to this service. This type of switching equipment has been installed throughout the refinery. As an additional precaution, all buildings housing motor driven pumps handling light oils are of steel and concrete construction and have been exceptionally well ventilated.

In order to be assured of uninterrupted power service, which was of course necessary to make this scheme practical, the Phillips Petroleum Co., co-operating with the Panhandle Power & Light Co., has worked out and installed a power transmission system which is probably different, at least in some respects, from any other systems, and which obviates practically every possibility of power interruption.

Transmission System

The power company has built two high lines from its power plant to the refinery, each one of which can be energized from different turbines in the plant. Under normal operations, the turbine supplying these high lines is also feeding on to the main buss through relays which automatically break this circuit in case of trouble on the main switchboard. In case this turbine develops trouble, the load is shifted automatically to a second turbine which supplies the power for all other field operations. The two high lines are so hooked up that in case of trouble on one the load is transferred to the other.



Control panel being installed at transformer of Borger, Tex., refinery of the Phillips Petroleum Co.

The refinery ends of these two high lines are slightly more complicated in arrangement. They connect to two high tension oil immersed switches which also automatically shift from one line to the other in case of loss of voltage. These two switches are connected to the same main high tension feeder buss which supplies two transformer banks. In between the main buss and each bank of transformers is placed an automatic oil circuit breaker. Both of these breakers are equipped with overload protection. The breaker which operates normally is equipped to open on single phase or short circuit and transfer the load to a spare transformer bank. The breaker on the normal bank at the instant it opens closes an auxiliary circuit which actuates the mechanism on the breaker on the spare transformer bank which instantly closes this breaker and places the spare transformer bank in service.

The spare line and bank are used only until the trouble on the normal system is corrected. As soon as possible the load is transferred back to the normal circuit.

In order to make the above system function, the secondary side of each transformer bank is equipped with oil

(Continued on Page 264)

Raoult's Law in Column Calculations

Can Be Used to Determine Overhead and Base Products from Rectification of Natural Gasoline when Binary Mixture Is Made

By George A. Burrell
Consulting Chemical Engineer, Pittsburgh, Pa.

Raoult's law can be used to calculate the overhead and base products from the rectification of natural gasoline of known composition when a binary mixture is made of the gasoline by dividing same into two parts.

Raoult's law states that the vapor pressure of any component in a mixture is equal to the product of its mol fraction or molecular percentage in the mixture times its vapor pressure in the pure state. This is one of several ways of stating the law. Thus the vapor pressure of any of the constituents in the mixture can be determined and from this the total pressure can be calculated (according to Dalton's law of partial pressures) or the composition of the mixture can be determined with respect to one component if the others are considered together as a second component.

Let the problem be to calculate the composition of the base product (finished natural gasoline) from a rectifying tower, and also the overhead product, if the initial mixture of gasoline from a natural gasoline plant, introduced into the column, has the following composition by weight:

	Per cent
Propane	10
Butane	45
Pentane and heavier	45
Total	100

The 45 per cent of pentane and heavier consists of

	Per cent
Pentane	35
Hexane	30
Heptane	20
Octane	15
Total	100

Assume the column is operated at a top temperature of 120° F., and a bottom temperature of 275° F., and under a pressure of 225 pounds per square inch absolute (17 atmospheres).

Calculating Vapor Pressure

One calculates the vapor pressures of the mixture of butane, pentane and higher in the initial mixture at the column top temperature, 120° F. First the percentage proportions of the components in the pentane and higher fractions are determined, thus:

Butane	45	45
Pentane	35	45
Hexane	30	
Heptane	20	45
Octane	15	
	90	

One can now calculate the partial vapor pressures at 120° F. of the different components by multiplying the pure vapor pressures by the mol fractions according to Raoult's law.

	Mol fraction	Pure vapor pressures (atmos.)	Partial vapor pressures (atmos.)
Butane	.59	5.80	3.422
Pentane	.17	1.58	.268
Hexane	.12	0.45	.054
Heptane	.07	0.11	.008
Octane	.05	0.07	.003
			3.755

Next there is calculated the mol fraction of propane in mixtures giving a total vapor pressure of 17 atmospheres, the column pressure at 120° F., the latter being the column temperature at the top. The total pressure of the butane to octane mixtures at 120° F. is 3.755 atmospheres as shown above. The vapor pressure of pure propane at 120° F. is 18.42 atmospheres.

The mol fraction of propane at 120° F. is determined thus:

X = mol fraction of propane.

$1 - X$ = mol fraction of butane to octane component.

P = total vapor pressure = 17 atmospheres.

P_a = vapor pressure of pure propane.

	Wt. proportions in C_4-C_8 mix.	Mol wts.	Mols per 100 gr. mix.	Mol fractions
Butane	45.0	58.1	.861	.59
Pentane	15.7	72.1	.241	.17
Hexane	13.5	86.1	.174	.12
Heptane	9.0	100.1	.100	.07
Octane	6.8	114.1	.066	.05
	90.0		1.442	1.00

P_b = vapor pressure of butane to octane components.

$P = X P_a + (1 - X) P_b$.

$17 = (X)(18.42) + 3.755 - (X)(3.755)$.

$X = .904$ = mol fraction of propane.

The vapor pressure of pure propane is 18.42 atmospheres. Since the mol fraction is .904 the partial pressure of the propane in the overhead fraction is

$.904 \times 18.42 = 16.64$ atmospheres.

The total pressure is 17 atmospheres. Hence the per cent of propane in the overhead fraction is $\frac{16.64}{17.0} \times 100 = 98$ per cent by volume, or 98.4 per cent by weight of propane and 1.6 per cent of

(Continued on Page 267)

TULSA TYPE

Shops, organization and stock material for speed delivery of any size contract

Illustrated at the right partial view of shops with five 141,000 lbs., and four 96,000 lbs. Refinery Bubble Towers on the floor.

Illustrated at the left STABILIZER 7 ft. dia. 71 ft. high weighing 143,000 lbs. manufactured for The Refinery Engineers, Inc., of Kansas City Mo.

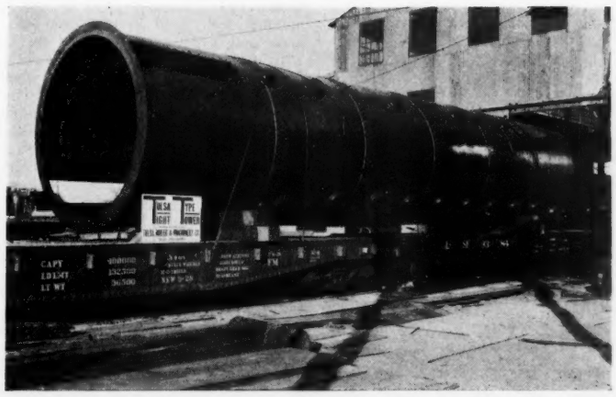
Tulsa, Oklahoma
2020 South Union Street

Tulsa TULSA TYPE Oklahoma

TULSA

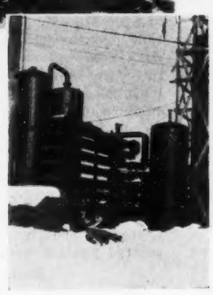
NATURAL GASOLINE PLANTS

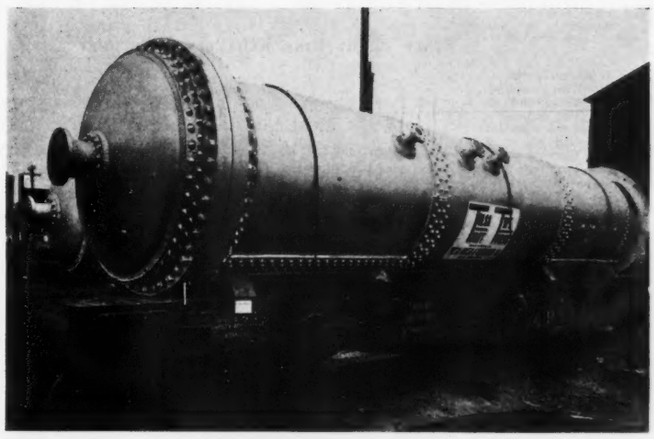
Refinery Equipment



View of Bubble Tower 10 ft. dia. 60 ft. high.

Below, Vapor Recovery and Debutanizing Equipment manufactured for Whealton & Townsend, Inc., Tulsa, Oklahoma.





Above, pictured high pressure Bubble Tower 5 ft. dia. 27 ft. 6 in. high with removable trays and bolted top head.

Oklahoma City, Oklahoma
443 Commerce Exchange Bldg.

Boiler & Machinery Co.

TANKS REFINING EQUIPMENT

Expand Cracking Plants in Rumania

Adapt Processes to Refine Several Grades of Charging Stock. Explain Operating Procedure and Yields Obtained

By Gustav Egloff
Universal Oil Products Co.

Rumania has utilized petroleum for many years, and is numbered among the more important oil producing nations. As early as 1750 travelers reported the use of mineral oil as an illuminant, as wagon grease and in treating diseases of cattle. In recent years, as shown by the table, oil production has steadily grown. In 1928 Rumania stood sixth among the oil countries of the world.

RUMANIAN PETROLEUM PRODUCTION, 1900-1929[1]

(In Barrels)

1910	9,724,000
1912	12,976,000
1914	12,827,000
1916	8,945,000
1917	3,724,000
1918	8,730,000
1919	6,618,000
1920	7,435,000
1921	8,368,000
1922	9,843,000
1923	10,867,000
1924	13,369,000
1925	16,650,000
1926	23,314,000
1927	26,368,000
1928	31,690,391
1929	37,000,000

[1]Petroleum Facts and Figures, page 6, American Petroleum Institute, 1929.
The Oil and Gas Journal, December 26, 1929, 142.
Production for 1929 estimated.

The oil refining of Rumania is largely confined to two towns, Ploesti and Campina. About 80 per cent of the country's oil production comes from within 20 miles of these centers.

Cracking Operations

A number of studies have been made of commercial cracking runs in the two Dubbs units at Campina for the purpose of determining yields of gasoline obtainable from fuel oils of different types and the properties of the cracked residuum. The units were operated by the residual oil flash type operations, which will be described in detail later.

In the first series of tests fuel oils from paraffinic, semiparaffinic and nonparaffinic crudes were subjected to cracking conditions during runs of from 7½ to 21 days. The average daily throughput of fuel oil per unit varied in different runs from 1,512 to 2,025 bbls. The yield of gasoline ranged between 33 and 45 per cent of the fuel oil processed. The details of these tests are presented in Table 1.

Pressed Wax Distillate

A study in more detail of the commercial cracking of pressed wax distillate is given below. The wax distillate had the following properties:

Gravity, ° A.P.I.	28.9
Cold test	37° F.
Engler distillation (100 cc)	
	° F.
Initial boiling point	440
Per cent distilled over:	
43.0	662
49.5	680
Residue, per cent	50.0
Loss, per cent	0.5

Table 2 reports the details of three cracking runs, operating from 30 to 33 days continuously on stream, while converting from 1,230 to 1,540 bbls. of oil daily, and using the flash system.

The yield of motor fuel, end boiling point 437° F., was about 44 per cent.

Paraffin Base Fuel Oil

A detailed study was also made of the cracking of a paraffin base fuel oil. Data were obtained from two commercial runs made on an oil of the following properties:

Gravity, ° A.P.I.	20.0
Cold test, ° F.	79

The results are summarized in Table 3. In the two runs reported, operation was continuous for 13.3 and 14.6 days, converting 1,745 and 1,615 bbls. of fuel oil daily into motor fuel (end boiling point 437° F.) with yields of 39 and 44.4 per cent.

The residual oil type of cracking unit operation, with the flashing system, permits the production of high yields of gasoline and furnace or Diesel oil, and a minimum amount of coke and gas, while the residual fuel oil has a higher thermal value per barrel than the original charging stock.

The use of the cracking process in this manner will best be understood by a description following the flow chart of an installation. Photographs of the Rumanian units used in this test are also presented.

In each cracking unit the pipe coil was composed of 72 tubes each 30 feet in length and 4 inches in diameter. The reaction chamber was 10 feet in diameter by 40 feet in height. The dephlegmator was 4 feet in diameter and 43 feet high, and provided with a series of perforated plates.

The oil to be cracked is pumped to the plant at a uniform rate by pump A, the suction side of which is connected to the oil storage tank. The raw charging stock may be pumped into the flash condenser C, to the dephlegmator H, or directly to the heating tubes I. All the charging stock may be pumped to any one of these elements of the cracking system, or it may be split as the operating conditions warrant. The charging stock pumped into the flash condenser C comes into intimate contact with the vapors from the flash chamber Q, so that the temperature of the charging oil is raised by condensing a portion of the vapors. The charging stock and condensed vapors are drawn from the bottom of the flash condenser C by the hot oil pump D and discharged into the dephlegmator H by means of the pipe connection G. The preheated charging stock comes into contact with the hot vapors in the dephlegmator and is thereby raised to a substantially higher temperature. As an alternative, part of all of the charging stock and condensed vapors from the flash condenser may go directly through the feed line E to the heating tubes I. The valves OO control the proportion of the split feed which passes to the heating coil I or to the dephlegmator H.

The feed oil enters the heating coil at a temperature of 690°-750° F., and passes through the heating tubes, which are connected by return bend fittings to form a continuous coil. The oil is heated by the gases generated in the combustion chamber L, attaining a cracking temperature of 870°-910° F. The products of combustion pass through port holes in the upper part of a well which divides the furnace into two chambers, and come in contact with the heating coil in chamber M. The combustion gases flow counter to the direction of the oil in the heating tubes, and the spent gases pass through a flue to the stack. The heated oil leaves the last tube of the coil and discharges from the transfer line J into the reaction chamber K. The reaction chamber is not fired or heated externally and is thoroughly insulated against heat losses.

Residual Oil

The residual oil is withdrawn from the lower portion of the reaction chamber K through the draw-off pipe connections N by means of control valves P. It then passes through line O into the flash chamber Q, which is maintained under a pressure lower than that of the reaction cham-

TABLE 2—CRACKING OF RUMANIAN PRESSED WAX DISTILLATE

	Run 1	Run 2	Run 3
Days on stream	31.0	33.0	31.5
Wax distillate cracked:			
Total, barrels	38,130	46,200	48,510
Per day on stream, barrels	1,230	1,400	1,540
Pressure distillate:			
Gravity, ° A.P.I.	53.0	52.2	52.0
Barrels per day on stream	701	847	958
Per cent of wax distillate charged	57.0	60.5	62.2
Residuum:			
Gravity, ° A.P.I.	12.7	11.2	10.7
Barrels per day on stream	418	441	471
Per cent of wax distillate charged	34.0	31.5	30.6
Gas, coke and loss, per cent of wax distillate charged	9.0	8.0	7.2
Gasoline, based on wax distillate charged:			
Fraction boiling to 392° F., per cent	38.8	38.0	39.7
Fraction boiling to 437° F., per cent	43.8	43.0	44.7
OPERATING CONDITIONS			
Temperatures	° F.	° F.	° F.
Liquid transfer	907	889	890
Reflux from dephlegmator	716	767	762
Vapor to water condenser	527	538	542
Hot feed oil from flash condenser	367	403	396
Hot feed entering heating coil	694	741	736
Furnace above heating tubes	1,542	1,542	1,542
Pressures			
Reaction chamber, lbs. per sq. in.	191	178	169
Flash chamber, lbs. per sq. in.	32	6	5
Pressure Distillate			
Gravity, ° A.P.I.	53.0	52.2	52.0
Engler distillation:			
Initial boiling point	88° F.	93° F.	100° F.
Temperature, ° F.—per cent distilled over:			
212	21.7	17.3	18.8
302	46.2	38.2	39.7
392	68.1	62.9	63.9
Gravity of gasoline fraction boiling to 392° F., ° A.P.I.	57.0	57.0	57.0
Pressure distillate bottoms, per cent of P. D.	24.4	30.1	29.6
Gravity, ° A.P.I.	33.0	35.5	34.5
Cracked Residuum			
	1	11	111
Gravity, ° A.P.I.	12.7	11.2	10.7
Flashpoint, ° F.	275	317	307
Viscosity, Saybolt Furol at 122° F.	23	35	37
Cold test, ° F.	10	20	15
Insoluble in benzene, per cent	0.30	0.51	0.46

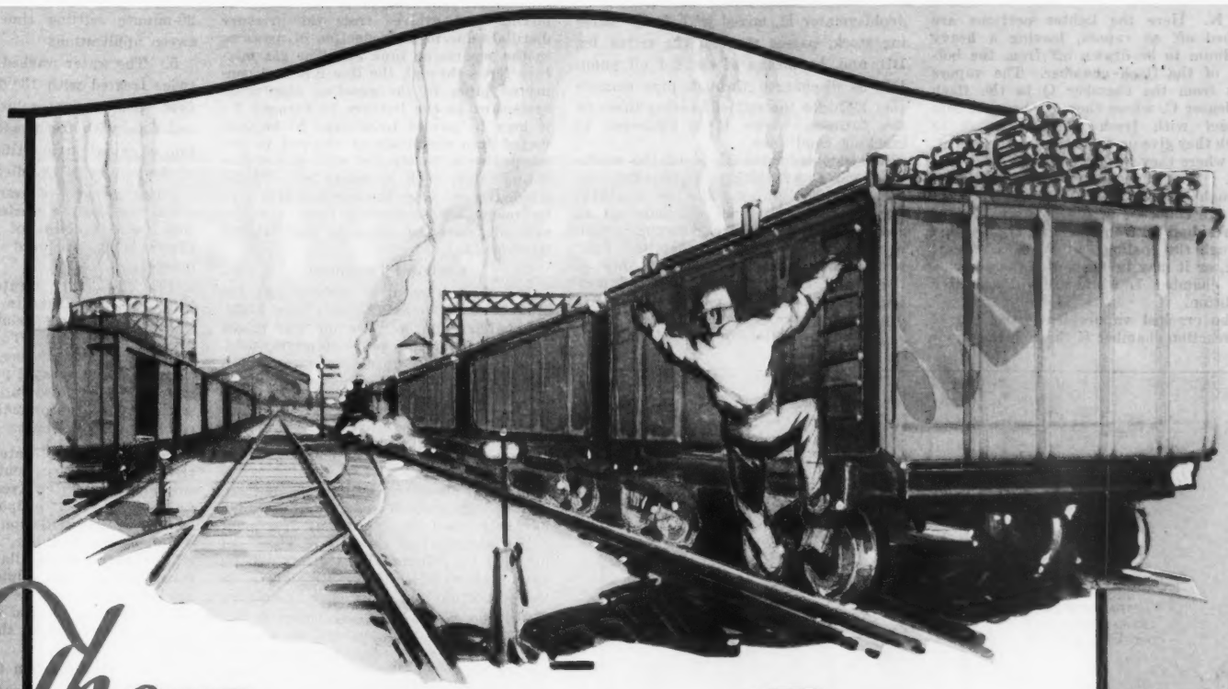
TABLE 3—CRACKING PARAFFIN BASE FUEL

	Run 1	Run 2
Days on stream	13.3	14.6
Fuel oil cracked:		
Total, barrels	23,209	23,579
Per day on stream, barrels	1,745	1,615
Pressure distillate:		
Gravity, ° A.P.I.	55.7	55.6
Barrels per day on stream	843	940
Per cent of fuel oil charged	48.3	58.2
Residuum:		
Gravity, ° A.P.I.	13.5	10.7
Barrels per day on stream	787	654
Per cent of fuel oil charged	45.1	40.5
Gas, coke and loss, per cent of fuel oil	6.6	1.3
Gasoline, based on wax distillate charged:		
Fraction boiling to 392° F., per cent	34.0	39.9
Fraction end boiling to 437° F., per cent	39.0	44.4
OPERATING CONDITIONS		
Temperatures	° F.	° F.
Liquid transfer	902	872
Reflux from dephlegmator	716	743
Vapor to water condenser	530	500
Hot feed from flash condenser	356	373
Hot feed entering heating coil	698	707
Furnace above heating tubes	1,543	1,543
Pressures		
Reaction chamber (lbs. per sq. in)	191	155
Flash chamber (lbs. per sq. in)	30	5
Pressure Distillate		
Gravity, ° A.P.I.	55.7	55.6
Engler distillation:		
Initial boiling point, ° F.	83	86
Temperature, ° F.—per cent distilled over:		
212	24.3	15.0
302	46.5	45.0
392	70.3	68.5
Gravity of gasoline fraction, boiling to 392° F., ° A.P.I.	57.0	57.0
Pressure distillate bottoms:		
Percent of P. D.	23.7	26.5
Gravity, ° A.P.I.	33.5	34.0
Cracked Residuum		
	1	11
Gravity, ° A.P.I.	13.5	10.7
Flashpoint, ° F.	293	302
Viscosity Saybolt Furol at 122° F.	36	42
Cold test, ° F.	17	18
Insoluble in benzene, per cent	1.1	1.3

TABLE 1—CRACKING RUMANIAN FUEL OILS

Fuel oil used as cracking stock—	Gravity ° A.P.I.	Viscosity Saybolt Universal at 122° F.	Cracking temp. liquid	Days on stream	Charging stock bbls. per day	Pressure distillate per cent	Residuum per cent	Viscosity residuum Saybolt Universal at 122° F.	Gas-coke loss per cent	Gasoline to 392° F. per cent of charge	Fraction to 437° F. per cent of charge
Campina paraffinic	22.0	325	918	8.5	1,455	54.2	42.5	*266	3.3	39.9	44.9
Paraffinic	20.2	338	889	17.0	1,710	44.7	52.6	1,500	2.7	32.4	37.4
Ochura semiparaffinic	21.6	357	918	16	1,512	48.3	48.2	2,300	3.5	35.4	40.4
Nonparaffinic	19.2	580	882	15	1,677	37.4	57.1	1,220	5.5	28.3	33.3
Noreni-paraffinic	17.5	375	904	8.5	1,681	43.6	51.0	*229	5.4	29.4	34.4
Nonparaffinic fuel oil and wax distillate (I)	20.0	385	887	7.5	2,025	41.6	56.2	1,220	2.2	31.2	36.2
Nonparaffinic fuel oil and wax distillate (II)	23.5	225	887	21.0	1,732	48.6	48.2	950	3.2	36.2	41.2
Mislea mixed base	21.0	325	904	21.0	1,521	43.9	52.1	1,420	4.0	32.4	37.4

[1]Estimated. *At 212° F.



The HAZARDS of DAMAGE to THREADS

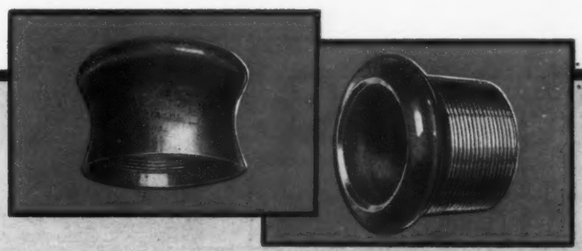
Consider how delicate are pipe threads and couplings—how the slightest blow will burr the threads of the best pipe. Then think how many, many times oil field pipe must be handled from pipe mill to destination—how many careless irresponsible hands it goes through before delivery—how it is banged on concrete sidings and dragged in sand and dirt.

NO WONDER COLONA THREAD PROTECTORS are recognized by most leading pipe manufacturers as vitally necessary to insure pipe delivery in the same perfect condition that it leaves the mill.

With these patented protectors readily available to every pipe manufacturer, ONE OF THE BEST EVIDENCES OF A PIPE MANUFACTURER'S CARE AND PRIDE in their product is the use of Colona Pipe Thread Protectors—the only type that gives 100 percent protection to both ends of the pipe.

Buy Colona Protected Pipe with confidence—specify Colona Protection in your order requisitions—it will save you much future annoyance and needless expense on pipe deliveries.

PITTSBURGH SCREW & BOLT CORP.
COLONA DIVISION **PITTSBURGH, PA.**



COLONA PIPE THREAD PROTECTORS

ber K. Here the lighter portions are flashed off as vapors, leaving a heavy residuum to be drawn off from the bottom of the flash chamber. The vapors pass from the chamber Q to the flash condenser C, where they are brought into contact with fresh charging stock to which they give up a portion of their heat, and where they in part undergo condensation. The uncondensed vapors pass through the line R to the cooling coil S and are collected in the receiver T. The hot residual oil from chamber Q may pass through the cooling coil W to a storage tank, or it may be burned in the combustion chamber L while still in a heated condition.

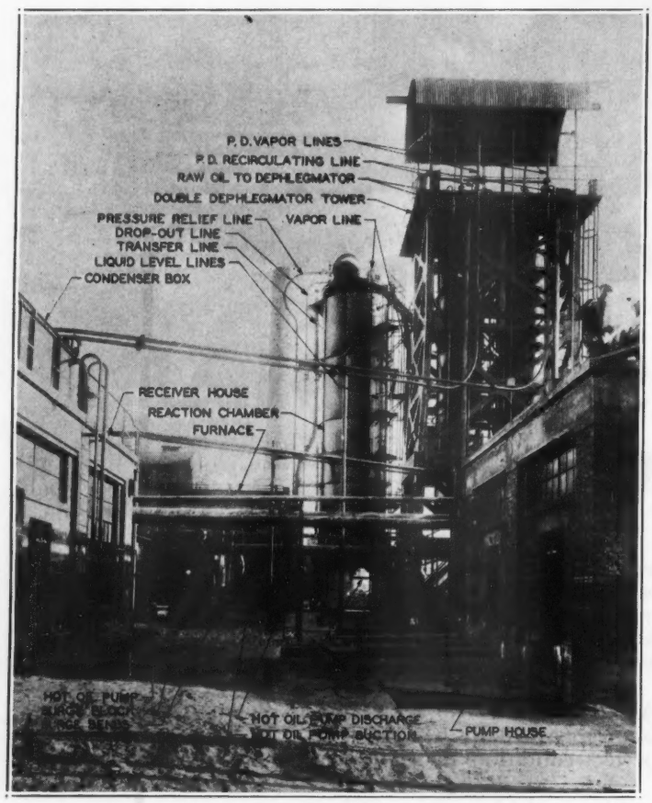
The cracked vapors leave the top of the reaction chamber K through the vapor line X, which is connected to the dephlegmator H, where they mingle with the ingoing preheated cracking stock.

The temperature of the vapors leaving the dephlegmator H is maintained at any point desired by cooling with pressure distillate oil. This cooling is accomplished by means of a pump Y, which discharges a portion of the pressure distillate drawn from the receiver HH into the recirculating line Z, the oil then entering the dephlegmator through the spray pipe AA.

Reflux Condensate

The reflux condensate oil from the dephlegmator H, mixed with fresh charging stock, passes through the reflux leg BB, and, by means of the hot oil pump DD, is discharged through pipe connection EE into the coil of heating tubes in the furnace, where it is subjected to cracking conditions.

The dephlegmator H is of the perforated pan type, which gives efficient contact of oil and vapor. The use of charging stock and pressure distillate oil as cooling means secures a refluxing action in the dephlegmator so that the light hydrocarbon vapors leaving the top of the dephlegmator through line FF may be of any quality desired. This light hydrocarbon vapor is condensed to a liquid as pressure distillate or crude gasoline in the cooling coil GG, from which it passes into receiver HH, maintained under the operating pressure of the system. The pressure distillate discharges through the meter SS into a gas separating chamber JJ, from which it flows to a storage tank through the trap LL. The operating pressure on the system is controlled by the gas valve RR through which gas in excess of that necessary to maintain the pressure desired, leaves the receiver HH, mixing that evolved from the pressure distillate due to the reduction of pressure in the separating tank JJ. The gas mixture flows through the line KK and connected pipes to the gasoline absorption system or to the burners in furnace F; it may be passed to storage to be converted into chemicals or shipped to gas companies to be blended with gas of low B.t.u. value, such as water gas. If desired, the gas from the receiver HH may be taken off separately from the gas evolved from the pressure distillate in receiver JJ.



Cracking unit in operation at Rumanian refinery.

Chemical Treatment

In the Rumanian operations the cracked distillate was treated in a 1,000-bbl. batch agitator. The oil was mixed with the chemicals used—sulphuric acid, caustic soda and water—by means of a centrifugal pump. The pump drew the reagents and distillate from the bottom of the agitator and discharged the mixture into the top.

The steps in the treatment were as follows:

1. The pressure distillate is agitated with 30° Be. caustic soda solution which has been used in a previous treatment (spent solution) at the rate of about 0.4 per cent by volume. This is followed by treatment with fresh 30° Be. caustic in the proportion of 0.4 per cent by volume.

2. The caustic soda treatment is followed by two water washings, the amount of water in each wash being approximately 20 per cent of the volume of pressure distillate. This leaves the distillate practically neutral.

3. The cracked distillate is then treated with 65° or 66° Be. sulphuric acid. The acid is mixed with the oil in three portions. The first application of acid is at the rate of 0.6 pounds per barrel of distillate, the second approximates 2.4 pounds per barrel and the third is about 3 pounds per barrel.

4. The acid treated distillate is then water washed five times. Each application of water is equal in volume to 20 per cent of the pressure distillate, and a 20-minute settling time is allowed between applications.

5. The water washed distillate is then twice treated with 13° Be. caustic soda, first with a spent solution and the second time with fresh material, each addition of caustic amounting to 0.2 per cent of the volume of the distillate.

The treatment of cracked distillate as above outlined is varied from time to time, as a function of the type of distillate being produced by the cracking process.

The chemically treated pressure distillate is fractionated in a battery of continuous stills into gasoline and pressure distillate bottoms. To neutralize the acidic material produced in this redistillation of the treated pressure distillate, ammonia is injected into the rerun stills at the rate of approximately 0.044 pounds per barrel of distillate.

The cracked distillate before chemical treatment contains about 0.13 per cent of sulphur, and after treatment 0.11 per cent. The Navy endpoint gasoline obtained by redistillation contains about 0.05 per cent sulphur, while the Diesel oil, or pressure distillate bottoms, contains 0.33 per cent sulphur. The percentage of sulphur varies as a function of the cracking stock and degree of conversion into gasoline in the cracking operation.

Hydrocarbon Content

The losses in chemical treating and redistillation, on the basis of the cracked distillate, were approximately 3 per cent. The cracked gasoline resulting from operating the units by the flashing system, using wax distillate as charging stock, showed hydrocarbons of the different groups present before and after treatment as in the following table. Data on the hydrocarbons present in straightrun gasolines from three Rumanian crudes are also given.

	Unsaturated hydrocarbons (%)	Aromatic hydrocarbons (%)	Naphthene hydrocarbons (%)	Paraffin hydrocarbons (%)
Cracked gasoline before chemical treatment	19	23.5	14.6	42.9
Cracked gasoline after chemical treatment	9.7	28.9	17.4	44.0
Straightrun gasoline from crudes as follows:				
Bustenari (old)	3	13.3	29.0	54.7
Arlanasi	4	24.0	14.0	58.9
Ceptura	2	7.2	20.1	70.7

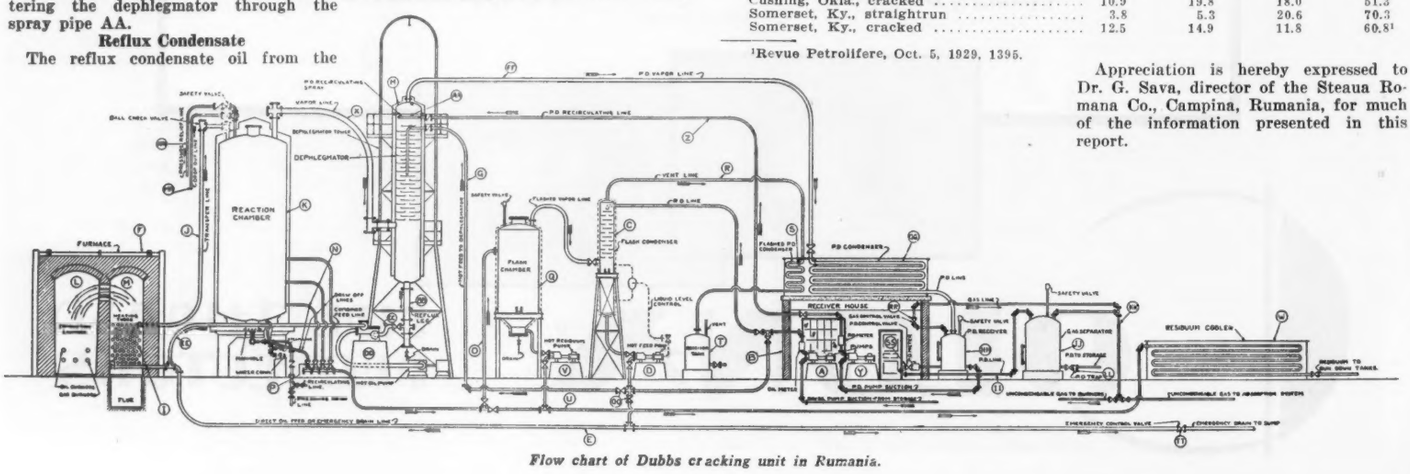
It is of interest to compare with these, analyses published elsewhere on the chemical constitution of straightrun Rumanian and of typical American gasolines.

COMPOSITION OF TYPICAL GASOLINES

	Unsaturated hydrocarbons (%)	Aromatic hydrocarbons (%)	Naphthene hydrocarbons (%)	Paraffin hydrocarbons (%)
Rumanian straightrun:				
Arbanesi	..	15.7	21 to 23	61.3 to 63.29
Moreni	..	23.3	16.2	60.5
United States:				
Pennsylvania straightrun	2.5	trace	14.9	82.6
Pennsylvania cracked	16.8	23.1	12.1	48.0
Mid-Continent straightrun	2.8	3.9	19.7	73.6
Mid-Continent cracked	15.0	18.5	12.6	53.0
California straightrun	2.2	10.4	28.1	58.0
California cracked	25.8	10.8	19.8	43.6
Smackover cracked	16.8	23.1	12.1	48.0
Cushing, Okla., straightrun	1.6	4.5	23.7	69.8
Cushing, Okla., cracked	10.9	19.8	18.0	51.3
Somerset, Ky., straightrun	3.8	5.3	20.6	70.3
Somerset, Ky., cracked	12.5	14.9	11.8	60.8[1]

[1]Revue Petrolifere, Oct. 5, 1929, 1395.

Appreciation is hereby expressed to Dr. G. Sava, director of the Steaua Romana Co., Campina, Rumania, for much of the information presented in this report.



Flow chart of Dubbs cracking unit in Rumania.

STOCKHAM
FANTZ-TYPE
RETURN BEND
is the answer to many present-day cracking still problems

STOCKHAM FITTINGS

To those who are vitally interested in such problems, we ask just enough time for a careful study of our design—you are to be the judge of its merits. Be a leader by adopting this modern and efficient method for your furnaces.

STOCKHAM PIPE & FITTINGS COMPANY
BIRMINGHAM, ALABAMA

See us at the OIL EQUIPMENT & ENGINEERING EXPOSITION *in Los Angeles March 16-23*

Patents applied for in the United States and in Argentina, Canada, Colombia, Dutch East Indies, England, France, Germany, Holland, India, Italy, Japan, Mexico, Persia, Peru, Poland, Rumania, Trinidad, Venezuela, Australia, Dutch West Indies and Cuba.

Used for (1) Aviation Gasoline (2) A Premium Motor Fuel (3) Blending

AND

The storage and handling losses are less than regular U. S. Motor

GRAVITY	75-79° API
INITIAL	95-100° F
83%, or more at	212° F
END POINT	350°, or lower
RECOVERY	98%

Phillips Petroleum Company
Bartlesville, Okla.

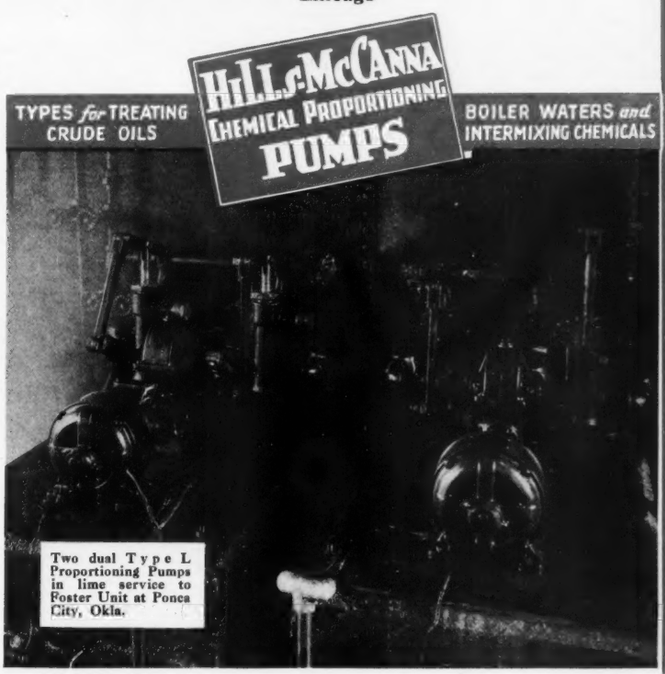
NATURAL GASOLINE FOR CONTROLLED VOLATILITY

© 1929, Phillips Petroleum Company

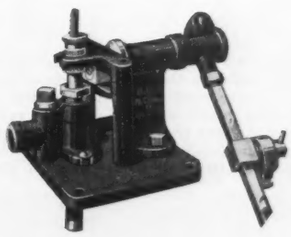
Strict control *according to formula*

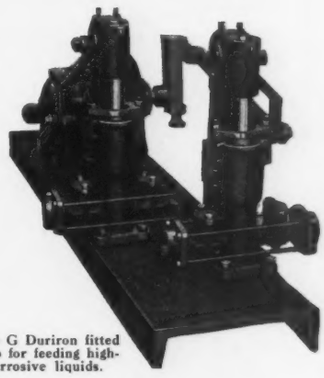
Hills-McCanna Proportioning Pumps accurately measure and discharge each dose of the liquid fed. Not a drop too little—Not a drop too much—No waste of chemicals. Uniform delivery is assured even when working against pressures. Capacities up to 308 gallons per hour. Use them for your proportioning needs. Ask for data.

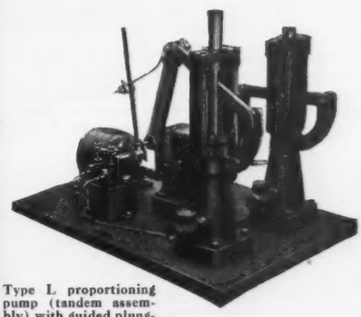
HILLS-McCANNA CO.
2351 Nelson St.
Chicago

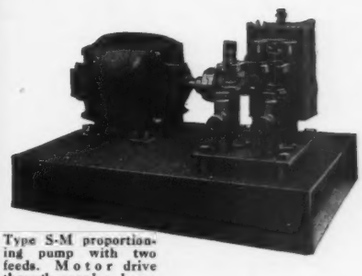


Two dual Type L Proportioning Pumps in lime service to Foster Unit at Ponca City, Okla.


Type S-R for proportioning or injecting small quantities of liquids. Rachet drive. Single or multiple feed.


Type G Duriron fitted pump for feeding highly corrosive liquids.


Type L proportioning pump (tandem assembly) with guided plunger for feeding liquids against medium pressures.


Type S-M proportioning pump with two feeds. Motor drive through speed reducer.

Simple Analysis of Heat Interchange

Explain Application of Analytical Method Which Provides Quick and Accurate Means of Securing Necessary Data

By E. G. Ragatz
Union Oil Co.

Practically all elementary heat interchanger problems are solved with the aid of an average heat transfer coefficient (K) and a log mean temperature difference factor. As long as the heat transfer coefficients and the specific heats of the materials undergoing heat transfer remain substantially constant, the use of this simple analytical method is justified. However, if vaporization enters the problem, or if the sensible heats or heat transfer coefficients change materially during the heat interchange operation, then the use of such average factors is liable to lead to large errors.

It is the intention of this article to demonstrate a graphical solution of the general interchanger problem in which the use of the log mean temperature difference and average heat transfer coefficient is entirely eliminated, and from which one may obtain a precise answer to his problem providing instantaneous values of the heat transfer coefficients and corresponding instantaneous rates of heat interchange can be determined.

The general principles of this graphical solution can best be explained by working out a simple problem, it being understood, of course, that these same principles are applicable to any complex interchanger calculation. For this simple explanatory problem we will consider the design of an interchanger cooling 50 penetration asphalt from 400° F. to 250° F., using 26° A.P.I. gas oil as a cooling medium. Two hundred barrels per hour of asphalt will be cooled in a simple double pipe interchanger made up of one 2½-inch standard pipe inside a 4-inch pipe. The asphalt will circulate through the inside of the 2½-inch pipe, and the gas oil through the annular space around the same. The gas oil will be heated from 150° to 300° F.

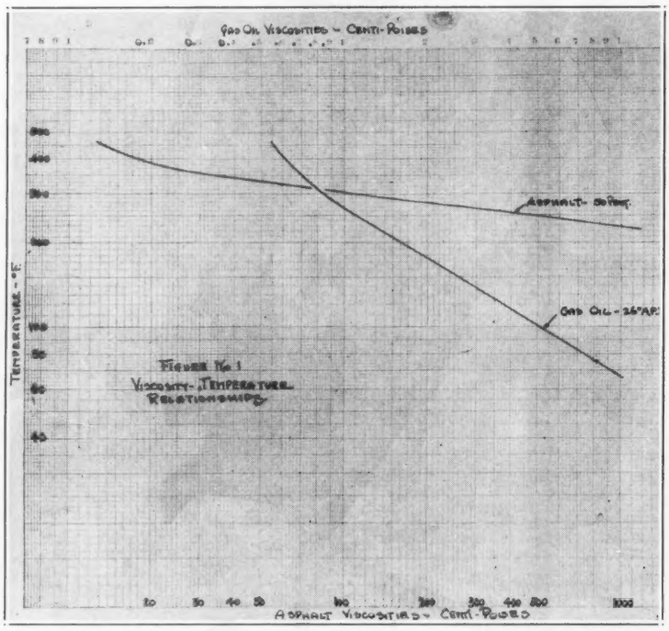


Figure No. 1
Viscosity-Temperature Relationships

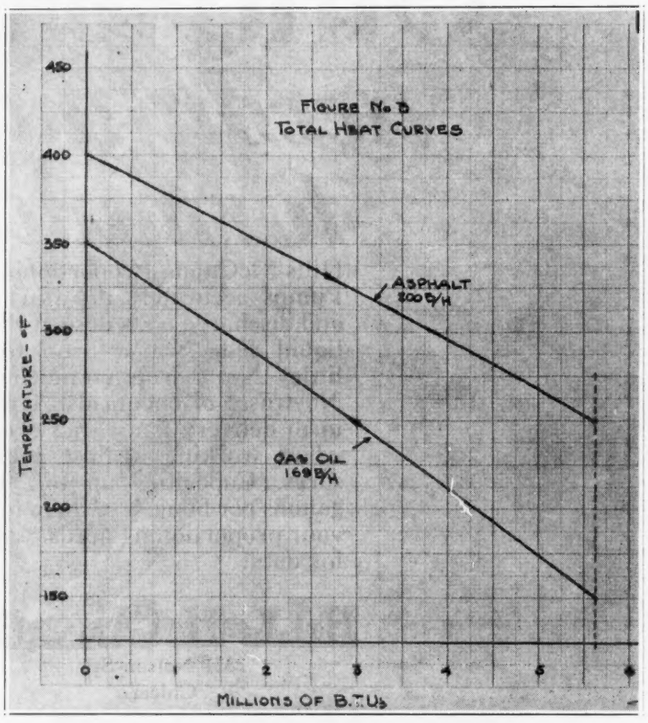


Figure No. 3
Total Heat Curves

For effecting the graphical solution of this problem, it will first be necessary to determine the instantaneous values of

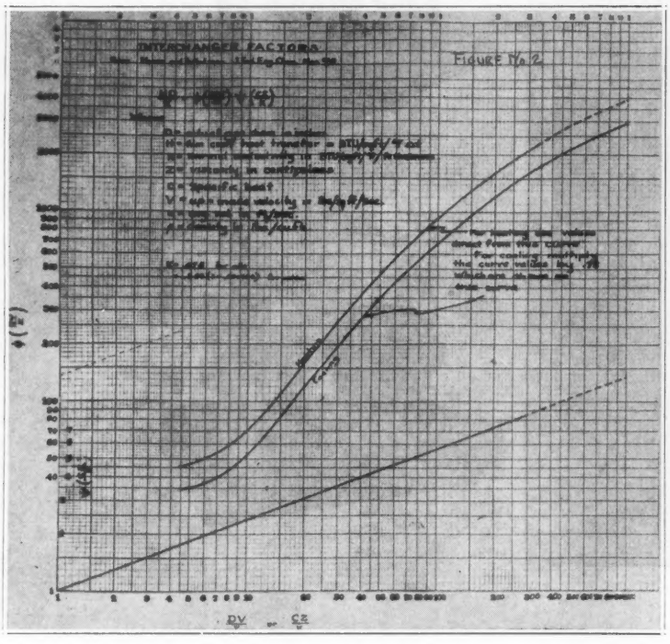


Figure No. 2

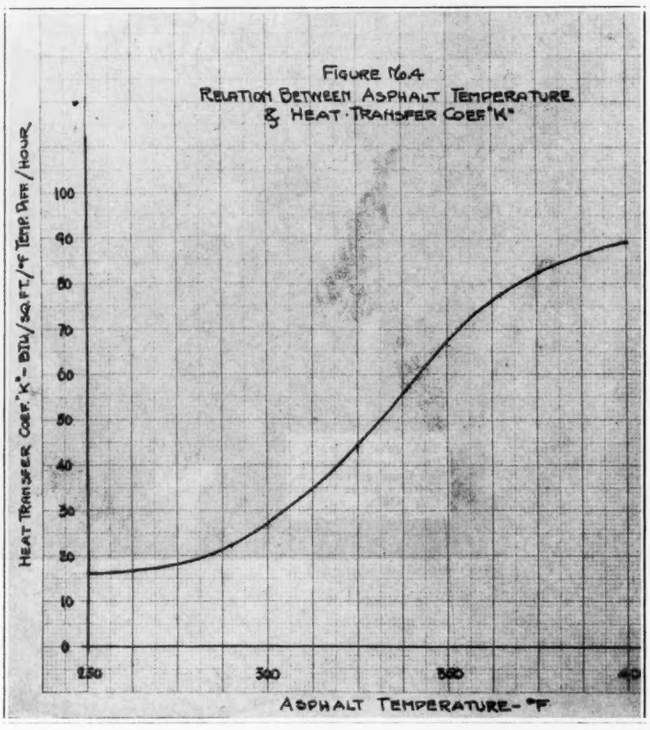
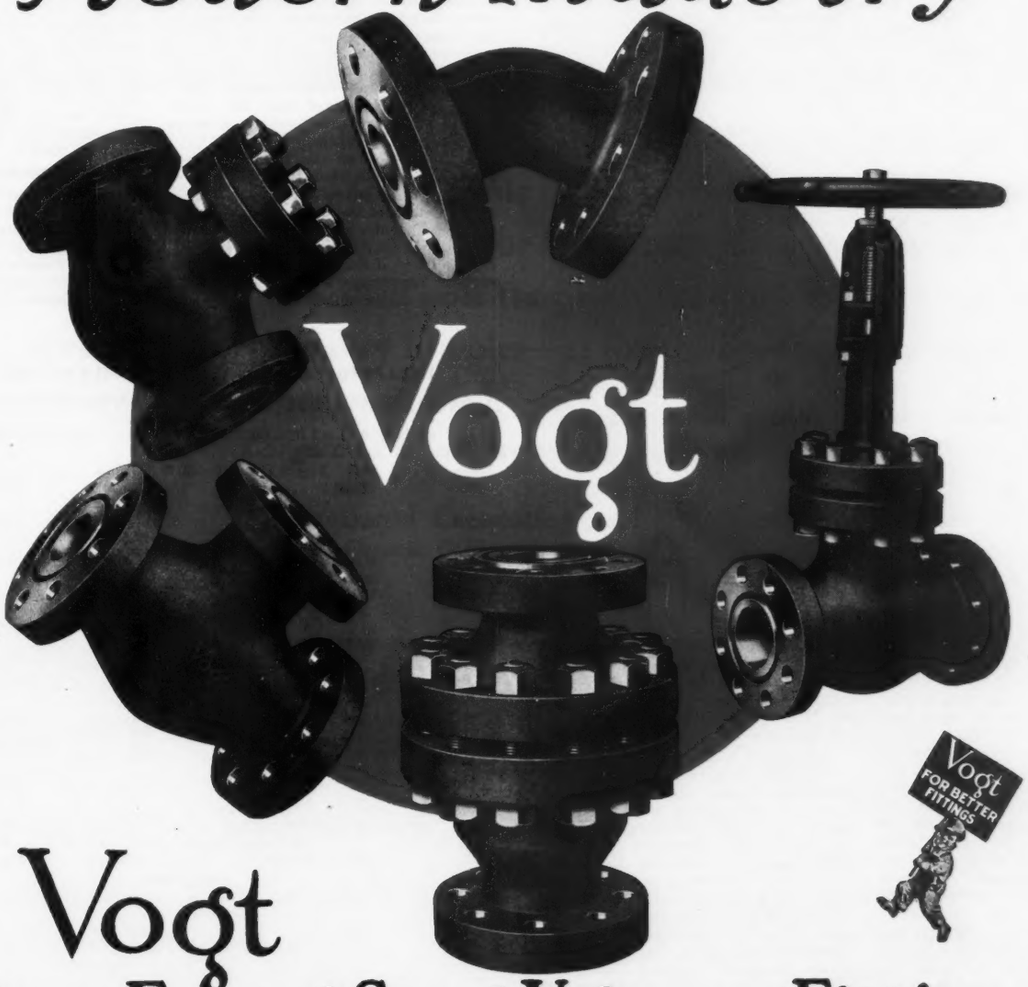


Figure No. 4
Relation Between Asphalt Temperature & Heat-Transfer Coef. "K"

In The Spotlight Of Modern Industry



Vogt

Drop Forged Steel Valves and Fittings

A Type for any Pressure and Temperature

HENRY VOGT MACHINE CO.
(Incorporated)
LOUISVILLE, KY.

New York Chicago Cleveland Dallas Philadelphia

Manufacturers: of OIL REFINERY EQUIPMENT, DROP FORGED STEEL VALVES AND FITTINGS, WATER TUBE AND HORIZONTAL RETURN TUBULAR BOILERS, ICE MAKING AND REFRIGERATING MACHINERY

the specific heats and heat transfer coefficients for a series of points through the system. The specific heats used in these calculations will be taken from Fortsch and Whitman (Industrial and Engineering Chemistry—August, 1926) and the instantaneous values of K calculated from the data of Morris and Whitman (Industrial and Engineering Chemistry—March, 1928). The absolute viscosities required for calculating the values of K from Morris and Whitman may be determined in the laboratory. Figure No. 1 gives such a set of viscosity-temperature relationships for the two commodities considered in this problem, while Figure No. 2 gives the heat transfer data of Morris and Whitman reduced to a single set of working curves.

Starting with these data, it will first be necessary to calculate the total heat curves of Figure No. 3. These curves give the increments of heat lost by the asphalt, or gained by the gas oil, for any temperature range of either commodity. In addition these curves also give the simultaneous temperatures of asphalt and gas oil for any point in the system; these reference points being defined by the amount of heat interchanged. The heat lost to the atmosphere is assumed to be negligible.

In developing the curves of Figure No. 3, 50 degree increments of temperature change have been taken for both the asphalt and the gas oil total heat calculations. The average specific heats for these temperature ranges, multiplied by 50 (the temperature increment) and the weight of material being handled, gives the total heat absorbed or given up for each 50° step. The data involved in these calculations are listed in Table No. 2 and the resultant curves plotted on Figure No. 3. It will be noted that the quantity of gas oil circulated (169 bbls. per hour) was calculated.

Heat Transfer Coefficients

The consolidated data on Figures Nos. 1 and 3, taken in connection with specific heat values from Fortsch and Whitman, are then used for evaluating a series of instantaneous heat transfer coefficients from Morris and Whitman, Figure No. 2. The calculation of these heat transfer coefficients is summarized in Table No. 2. It will be noted that these instantaneous values of K have been computed for a series of asphalt temperatures. Figure No. 4 gives the relationship existing between asphalt temperature and the corresponding instantaneous heat transfer coefficient as determined by these calculations.

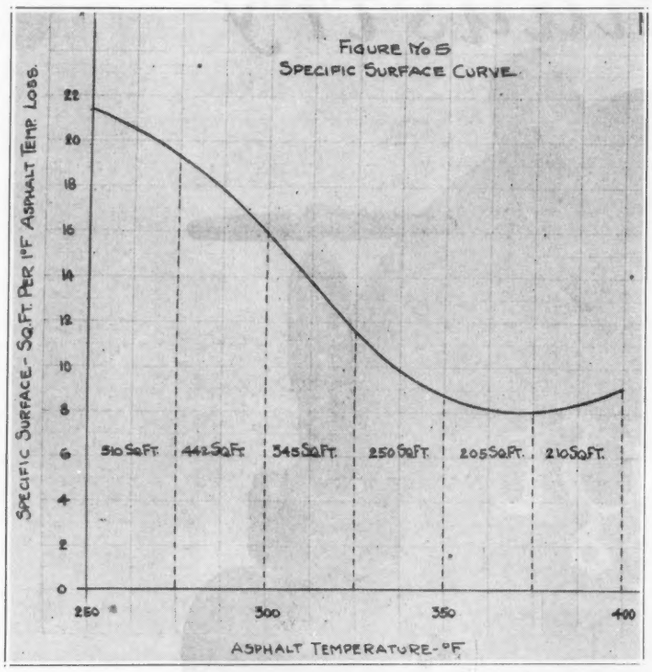
The original data of Morris and Whitman cover only the calculations of the surface coefficient, H, for the inside of a circular pipe. In extending these data to the present problem, therefore, we have found it necessary to make the two following assumptions:

1. For calculating the H of the gas oil flowing through the annular space between the outside of the 2½-inch and the inside of the 4½-inch pipe, use a value for D (pipe diameter in inches) equal to four times the hydraulic radius of the annular section.

2. The surface for which the instantaneous Ks will be calculated will consist of outside surface of 2½-inch pipe. The initially calculated H for the asphalt, however, is for the inside surface of this pipe. This inside H can be corrected for use with the ouside surface by multiplying H by the ratio of the inside to outside surfaces.

The overall heat transfer coefficient K is obtained from the individual surface coefficients by the aid of the elementary resistance relationship that the reciprocal of the overall coefficient is equal to the sum of the reciprocals of the individual surface coefficients, the resistance of the tube wall being considered negligible. It is recognized that these calculated Ks are open to considerable question. However, this fact in no way invalidates the method used in the subsequent graphical analysis, though the point should be kept clearly in mind that the final solution of the problem is always limited in accuracy to the accuracy obtained in calculating the instantaneous values of the heat transfer coefficients.

Figure No. 4 indicates the wide variation in heat transfer rate existing through the interchanger. It should be obvious that problems involving heat transfer rate variations of this magnitude can rarely be handled analytically with the use of a single "mean" heat transfer coefficient as outlined in the elementary theory.



Specific Surface Curve

The values for the specific surface curve of Figure No. 5 are next computed, using data taken from Figure Nos. 3 and 4, combined with specific heat data from Morris and Whitman. The "Specific Surface" used in this curve is that surface in square feet (outside of 2½-inch pipe) required to change the asphalt temperature 1° F. The calculation of these specific surface values is summarized in Table No. 3, it being noted that this surface is a function of the instantaneous values of K, and the corresponding values of the instantaneous temperature differences existing between the gas oil and asphalt. Here again it will be noted that the values for the curve are calculated for a series of asphalt temperatures.

An inspection of the specific surface curve shows that when the asphalt is at 250° F., 21.4 square feet of surface are required to cool the asphalt 1° F., while at 370° F. only 8.0 square feet of surface are required to cool the asphalt 1° F. These differences in interchanger surface requirements are due both to variations in the temperature differences existing between the gas oil and the asphalt and to variations in the instantaneous values of K, with the latter variations having the greater effect. When the asphalt is coldest the temperature difference between the gas oil and asphalt is largest, but at the same time the overall heat transfer coefficient is also the lowest, hence the cold end of the interchanger uses the largest amount of surface per degree change of asphalt temperature. Then, as the interchanger gets hotter, the overall K increases and the specific surface correspondingly decreases.

With this higher temperature, however, the temperature difference between the asphalt and the gas oil decreases, which effect tends, in turn, to increase the value of the specific surface. At 370° F. the effect of the decrease of temperature difference overtakes the increasing K effect, and from that point on we find the specific surface increasing. Thus we see that the heat interchange effects occurring through such a unit are considerably more complicated than those dealt with in the simple elementary theory.

Interchanger Problem

With the specific surface curve constructed, the solution of the interchanger problem is in sight, for the integration of this curve between the limits of the asphalt temperature range gives the required interchanger surface. In other

(Continued on Page 286)

TABLE No. 1

CALCULATION OF TOTAL HEAT VALUES FOR FIGURE No. 3

(Specific heat data—Morris & Whitman)

Asphalt-S.G.=1.02@60°F.			Gas Oil-°A.P.I.=26@60°F.		
Temp.	S.H	Avg. S.H.—ΔT=50°	Temp.	S.H	Avg. S.H.—ΔT=50°
400°	0.570		150°	0.470	
		0.555			0.485
350°	0.540		200°	0.500	
		0.525			0.515
300°	0.510		250°	0.530	
		0.495			0.545
250°	0.480		300°	0.560	
					0.575
			350°	0.590	

@200 B/H of Asphalt

Weight of Asphalt=200×350×1.02=71,400 lb./H

B.T.U./H Lost from Asphalt	400°–350°=71,400×50×0.555=	1,982,000
B.T.U./H Lost from Asphalt	350°–300°=71,400×50×0.525=	1,875,000
B.T.U./H Lost from Asphalt	300°–250°=71,400×50×0.495=	1,768,000
Total		5,625,000

Wt. of Gas Oil Required to Cool Asphalt (G.O. ΔT=150–350°F.)

Wt.×200×0.530=5,625,000 B.T.U./H

Where 0.530=Avg. S.H. of G.O. Between 150–350°F.

$$\text{Wt.} = \frac{5{,}625{,}000}{200 \times 0.530} = 53{,}100 \text{ lbs./H}$$

$$\text{Bbls./H Gas Oil} = \frac{53{,}100}{314} = 169 \text{ B/H}$$

B.T.U./H Taken Up by Gas Oil	150°–200°=53,100×50×.485=	1,287,000
B.T.U./H Taken Up by Gas Oil	200°–250°=53,100×50×.515=	1,368,000
B.T.U./H Taken Up by Gas Oil	250°–300°=53,100×50×.545=	1,445,000
B.T.U./H Taken Up by Gas Oil	300°–350°=53,100×50×.575=	1,525,000
Total		5,625,000

TABLE No. 2

CALCULATION OF HEAT TRANSFER COEF. VALUES (K) FOR FIGURE No. 4

	Asphalt at 400° F.		Asphalt at 365° F.		Asphalt at 325° F.		Asphalt at 285° F.		Asphalt at 250° F.	
	Asphalt	Gas oil	Asphalt	Gas oil	Asphalt	Gas oil	Asphalt	Gas oil	Asphalt	Gas oil
T, Temp.-Figure 3 ...	400°	350°	365°	303°	325°	250°	285°	197°	250°	150°
D—Inside Dia.	2.47	1.15	2.47	1.15	2.47	1.15	2.47	1.15	2.47	1.15
V=lbs./sq. ft./sec. ..	590	340	590	340	590	340	590	340	590	340
Z=Visc.-Figure 1 ...	18	0.70	25	0.82	60	1.10	160	1.65	450	2.60
DV/Z	81	560	58.3	477	24.3	355	9.1	237	3.2	150
Φ, Figure 2	760	2,300	560	2,100	200	1,800	65	1,400	34	960
C, Sp. Heat, M. & W.	0.565	0.590	0.550	0.560	0.525	0.530	0.503	0.500	0.490	0.470
K—Ther. Cond., Figure 2	.078	.078	.078	.078	0.78	0.78	0.78	0.78	.078	0.78
CZ/K	130	5.3	176	5.9	404	7.5	1,035	10.6	2,800	15.6
Ψ	6.2	1.9	7.0	2.0	9.5	2.1	14	2.4	20	2.8
HD/K = Φ × Ψ ...	4,700	4,370	3,920	4,200	1,900	3,780	910	3,360	680	2,700
H = .078 Φ × Ψ/D	148	296	124	285	60	257	29	228	21	183
Corrected H	127	...	106	...	52	...	25	...	18	...
1/H	.00788	.00338	.00945	.00350	.0192	.00390	.0400	.00440	.0556	.00546
K=Heat Trans. Coef.	89.0	...	77.5	...	43.3	...	22.5	...	16.3	...

TRAIN LOADS
Prompt shipment of poles, roofed and gained to meet your special needs — poles ready for the hole upon arrival — can be depended upon from International. The large stock always on hand—an adequate crew of skilled pole framers make quick shipment a positive assurance. Quality in poles—in treatment—in preservative is paramount to International.
Large and small orders carefully executed.
International Creosoting and Construction Co.
General Offices—Galveston, Texas
Plants: Texarkana Beaumont Galveston
Distributed by GraybaR ELECTRIC COMPANY
International Creosoted Yellow Pine Poles

Applying Thermodynamics to Cracking

Third Law Tells Nothing About Rate of Reaction. Reactions and Products Always Changing Until Oil Is Distilled

By George A. Burrell
Consulting Chemical Engineer, Pittsburgh, Pa.

The third law of thermodynamics provides a means of predicting from thermal data whether or not,

(a) A gaseous reaction can proceed.

(b) Which of several reactions leads to the most stable state of the system.

(c) The magnitude of the driving force tending to cause the reaction to proceed.

(d) The condition of equilibrium for the reaction under consideration.

It tells nothing regarding the force opposing the reaction, hence does not predict reaction rates. But a system is just as unstable if it changes slowly from its initial state to its stable one as if it changed rapidly.

An apparent stumbling block to the use of the calculations lies in the fact that apparently equilibrium reactions are not set up in a cracking still, i.e., the reactions and products are always changing until the oil is distilled or drawn from the still. But at any instant the system is thermodynamically stable at the particular temperature involved, even though it changes the next instant, and this is all that is necessary in predicting equilibrium (i.e., stable systems) by means of the third law.

Many reaction products at the different temperatures employed in commercial cracking systems have already been calculated, mainly by Francis and by Sachanov, and some have been predicted that have not been checked in the cracking system because of the difficulty in analyzing the products of the systems. Thus theory is ahead of practice in some degree.

Thermal Data Required

Thermal data required for the calculations are,

(a) The heat contents of the different substances involved in the reaction.

(b) The ordinary heat of reaction as determined calorimetrically, or as calculated from the heat of formation of each substance involved.

Of course equilibria in systems can be determined experimentally, as well as by calculation from the third law, but the experimental determination is often exceedingly difficult, if not impossible. Herein lies the chief unity of the law.

As a matter of fact the calculated method does not represent the application of the third law alone, but also the first and second laws of thermodynamics. The first law states that matter can be converted from one form to another but cannot be destroyed or created. In using the second law it must be assumed that every chemical or physical process, if left to itself, proceeds slowly or rapidly to a definite state of rest, and that when heat is converted into work isothermally the maximum work obtained is equal to the heat so converted.

The third law has been modified from Nernst's original conception. He assumed that the heat capacity of solids and liquids approached the same value per atom at the absolute zero. Now it is assumed that the essence of the law lies in the statement that the heat capacity of all crystalline solids, and likewise the entropy, is equal to zero at the absolute zero. Thus one can calculate the heat content of a crystalline solid from heat capacity data alone. If one knows the heat content of a solid one can then calculate the heat content of the gas produced by vaporization of the solid.

A system is in a stable state (in equilibrium) when the heat of reaction produced by an infinitesimal displacement from equilibrium is equal to and opposed by the change in the heat content of the system plus the work done due to change in volume. It is not stable when the heat of reaction, produced by an infinitesimal movement toward equilibrium is greater than the corresponding change in heat content. This difference causes the driving force of the reaction, and when measured in calories is called the free energy of the reaction. The latter enlarges as the system moves away from an equilibrium state, and decreases as the system approaches equilibrium. This decrease in free energy accompanying a reaction is referred to simply as the free energy of the reaction in question.

Standard Necessary

It is necessary to adopt some standard quantity and concentration of each substance in making the calculations, hence these standards are taken in gram-molecular equivalents. The activity of a gas is taken at unit pressures (one atmosphere). Thus for the reaction,

$$CH_4 \rightleftharpoons C + 2H_2$$

the standard free energy becomes the heat evolved when 16 grams of methane at 1 atmosphere pressure reacts isothermally with 12 grams of carbon and 4 grams of hydrogen at atmospheric pressure.

Now it is possible to calculate the standard free energy of a reaction in terms of the maximum useful external work which the system can do in moving isothermally from the initial standard state (unit activities of reacting and resulting substances) to equilibrium, because for this condition the maximum useful external work is equivalent to the heat evolved.

The term which expresses this maximum work contains the logarithm of K_p, the ordinary equilibruim constant for a reaction proceeding at constant pressure. The maximum work is equivalent to the free energy; hence it comes about that there is a simple relationship between standard free energy, which can be calculated from thermal data, and the equilibrium constant. This relation is:

$$\triangle F = 2.303\ RY \log K_p$$

where,

F = standard free energy in calories
R = the gas constant (1.9985)
T = absolute temperature
K_p = the common logarithms of the equilibrium constant for the reaction at constant pressure.

Equation 1 enables log K_p and hence K_p at the temperature T to be calculated from the standard free energy, $\triangle F$, thus.

$$\log K_p = \frac{\triangle F}{2.303\ RT} \qquad (2)$$

Heat Content of a Solid Substance

Before we derive Equation 1 it is advisable to first consider what is meant by the heat content of a solid. This is made up of the internal energy which resided in the body by virtue of its being at the temperature T, and the heat equivalent of the work done by the external pressure on the substance due to its change from its initial volume V to its final volume at absolute zero, V_o.

If specific heats were constant at all temperatures the calculations would be simplified. Then the internal energy would be equal to the product of specific heat at constant volume and temperature drop plus the internal energy at the absolute zero. But specific heat varies with temperature, hence,

$$E = \int_o^T C_v dT \qquad (3)$$

where

E = the internal energy
T = absolute temperature
C_v = molal specific heat at constant volume.

The energy change on cooling, which is due to work done on the solid, is equal to the product of pressure and change in volume, and is of negative sign if there is a contraction in volume. Or the work of contraction under external pressure represents a gain in energy for the substance.

This is expressed,

$$W = 24.23\ P\ (V - V_o) \qquad (4)$$

where

W = the work expressed in calories
V and V_o = liters per mol.
24.23 = one liter-atmosphere.
P is expressed in atmospheres.

According to the definition of heat content, which will be called H,

$$H = E + W, \qquad (5)$$

or,

$$H = \int_o^T C_v dT + W \qquad (6)$$

If the specific heat of the solid is determined by measurements conducted at constant pressure, such a specific heat value includes the heat equivalent of the work done due to change in volume and hence,

$$\int_o^T C_p dT = \int_o^T C_v dT + W \qquad (7)$$

From this it follows that,

$$H = \int_o^T C_p dT \qquad (8)$$

The molal specific heat, C_p, is equal to zero at the absolute zero in the case of solids, according to the third law.

In order for the integrals,

$$\int_o^T C_p dT \text{ and } \int_o^T C_v dT,$$

to be evaluated from experimental data, C_p (or C_v) must be either expressed in terms of T, as for instance by a power-series equation,

$$C_p = a + bT + CT^2 + \text{———} \qquad (9)$$

or graphical methods can be used. These consist in determining the area under the curve obtained by plotting C_p against T.

Heat Content of Gaseous Substances

Equations 5, 6, 7 and 8 also apply to gaseous substances, but 6 and 7 are simplified as a result of the P—T—V relationships which hold for this class of substances. Thus Equation 6 reduces to

$$H_g = \int_o^T C_v dT + RT \qquad (10)$$

where R, the gas constant, equals 1.9885 calories, and Equation 7 becomes,

$$\int_o^T C_p dT = \int_o^T C_v dT + RT \qquad (11)$$

Heat of Reaction

When a reaction occurs isothermally at the temperature T and at the constant pressure P, a certain quantity of heat H is absorbed by surroundings (e.g., the calorimeter). According to the first law of thermodynamics the heat absorbed is equal to the difference between the heat contents before and after reaction, hence,

$$\Delta H = \Sigma H_i - \Sigma H_r \qquad (12)$$

where,

ΣH_i = the sum of the heat contents of the initial substances
ΣH_r = that of the resultants.

If ΔC_p represents the difference between the sum of the molal specific heats at contanst pressure of the initial substances and that of the resultants, Equation 12 becomes,

$$\Delta H = \int_o^T \Delta C_p dT \qquad (13)$$

Converson of Thermal Values from Constant Volume to Constant Pressure

Thermal values at constant volume are preferably converted to constant pressure conditions before applying them in equations relating to free energy and equilibrium, and this procedure is followed in the present treatment.

It can be deduced from the preceding equation that,

$$\int_o^T C_p dT = \int_o^T C_v dT + PV \qquad (15)$$

and

$$C_p = C_v + \frac{P dv}{dT} \qquad (16)$$

for solids and gases, and that for gases these last two equations reduce to,

$$\int_o^T C_p dT = \int_o^T C_v dT + RT \qquad (17)$$

and

$$C_p = C_v + R \qquad (18)$$

If E is the heat of reaction at constant volume,

$$\Delta E = \int_o^T C_v dT \qquad (19)$$

and

$$\Delta H = E - nRT \qquad (20)$$

where n is the number of mols of initial substances in gaseous form minus that of the gaseous resultants. If a reaction is accompanied by an increase in volume n is accordingly negative and ΔE is larger than ΔH. No account is taken here of changes in volume of solids because these are negligible in the case of reactions involving both solids and gases.

Calculation of Entropy

When a chemical reaction proceeds in a thermostat the amount of mechanical or electrical work actually done as a result of the reaction does not correspond to the maximum work which could be accomplished. Consider the case of aqueous sulphuric acid acting upon zinc in a thermostat to form aqueous zinc sulphate and hydrogen under constant atmospheric pressure. No work is performed except a slight amount against the atmosphere by the evolved gas and which is necessary for the reaction to proceed. This work cannot be used externally for any useful purpose. But if a galvanic cell be put in the thermostat with a zinc electrode in contact with a platinized one, and both be connected to a motor to utilize the electric current produced, a certain amount of useful external work will be done, reaching its maximum when it is conducted reversibly, i.e., without loss due to friction or other effects. This maximum useful work obtained from a chemical reaction is known as the free energy of the reaction in question.

The amount of heat absorbed (or lost) by the thermostat will not be equal to the heat of reaction but will be either larger or smaller, depending upon whether the thermostat receives or loses heat as a result of the useful work performed. In the case of such a reversible action

the heat absorbed by the thermostat will be designated as Q.

It immediately follows from the first law of thermodynamics that,

$$Q=\Delta H-\Delta F \qquad (21)$$

where,

F=the maximum useful work, or as it is preferably called, the free energy change measured in calories.

The expression entropy change $\triangle S$ will now be defined as the quantity of heat Q which a system absorbs at the temperature T divided by T, or

$$\Delta S=\frac{Q}{T} \qquad (22)$$

from which it follows that,

$$Q=T\Delta S \qquad (23)$$

Hence it follows also that free energy may be expressed by the equation,

$$\Delta F=\Delta H-T\Delta S \qquad (24)$$

An expression will now be derived for the entropy in terms of molal specific heat data. The heat absorbed by a substance at the temperature T for an infinitesimal increase in temperature at constant pressure is equal to $C_p dT$ and hence the entropy change involved is $\frac{dT}{T}$ equal to $C_p\frac{dT}{T}$ which is mathematically identical with the quantity 2.303 C_p.d (log T). The entropy, therefore, of a substance at the temperature T is equal to the integrated sum of such terms as the latter from the absolute zero up to the temperature T, or

$$S=2.303\int_0^T C_p.d(\log T) \qquad (25)$$

To obtain the value of the integral it is necssary to express C_p in terms of T. by means of a power series equation like Equation 9, or have recourse to a graphical method, which consists in determining the area under the curve obtained by plotting C_p against log T and multiplying such area by 2.303.

All gases first undergo liquefaction and then solidification before the absolute zero is reached, so that specific heat measurements on the gas are experimentally impossible down to the absolute zero. But this difficulty can be surmounted because entropy is an additive property, like heat content or free energy. Hence the entropy of a gaseous substance at the temperature T is equal to the entropy of the substance in solid form from absolute zero up to its melting point T_m plus the entropy of melting plus the entropy of the liquid from T_m to T_v, where T_v is the boiling point under atmospheric pressure, plus the entropy of the gas from T_v up to T—the temperature in question. Since entropy is defined by the term $\frac{Q}{T}$ where Q is the heat absorbed at the temperature T, the entropy change on melting (ΔS_m) is given by the equation:

$$\Delta S_m=\frac{L_m}{T_m} \qquad (26)$$

where L_m is the molal heat of melting and T_m is the melting temperature. Similarly,

$$\Delta S=\frac{L_v}{T_v} \qquad (27)$$

where S_v, L_v, and T_v are the entropy on vaporization, the molal heat of vaporization, and boiling temperature, respectively, all at 1 atmosphere pressure. Therefore, it is possible to write the entropy Equation 25 as follows:

$$S=2.303\int_0^{T_m} C_{ps}.d(\log T)+\frac{L_m}{T_m}$$

$$+2.303\int_{T_m}^{T_v} C_{pv}.d(\log T)+\frac{L_v}{T_m}$$

$$+2.303\int_{T_v}^{T} C_{pg}.d(\log T) \qquad (28)$$

where $[C_{ps}]$, $[C_{pv}]$, and $[C_{pg}]$ refer to the molal specific heat of the substance in the solid, liquid and gaseous states, respectively.

If a substance vaporizes at atmospheric pressure without melting Equation 26 reduces to

$$S=2.303\int_0^{T_s} [C_{ps}].d(\log T)+\frac{L_s}{T_s}$$

$$+2.303\int [C_{pg}].d(\log T) \qquad (29)$$

Equations 25, 28 and 29 enable the entropy of any substance to be calculated from specific heat or from specific heat and latent heat data. The values for entropy given by Gilbert N. Lewis were calculated by this method or its equivalent.

When the entropies of the substances taking part in a reaction are known and since entropy is an additive property, the value of ΔS in Equation 24 may be obtained by subtracting the sum of the entropies of the resultants from that of the initial substances.

From a knowledge of ΔS, the entropy change, and of ΔH, the heat of reaction, the free energy of the reaction (ΔF) may be obtained directly by Equation 24, which reads $\Delta F=\Delta H-T\Delta S$.

Rate of Change of Reaction Heat, Entropy Change and Free Energy with Temperature

Upon differentiating Equation 13 for reaction heat with respect to temperature and thereby obtaining the temperature-coefficient of reaction heat or its rate of change with temperature, the following relationship is obtained:

$$\frac{d(\Delta H)}{dT}=\Delta C_p \qquad (30)$$

or the rate of change of ΔH with temperature is equal to the difference between molal specific heats of initial and resultant substances, ΔC_p.

On doing likewise with the corresponding equation for entropy change, the following equation is obtained:

$$\frac{d(\Delta S)}{dT}=\frac{\Delta C_p}{T} \qquad (31)$$

In other words the temperature-coefficient of the entropy change in a reaction is equal to ΔC_p divided by temperature. Upon differentiating the product $T\Delta S$, there is obtained:

$$\frac{d(T\Delta S)}{dT}=T\frac{d(\Delta S)}{dT}+\Delta S \qquad (32)$$

It is now possible to write down the differential of the free energy Equation 24 as follows:

$$\frac{d(\Delta F)}{dT}=\Delta C_p-T\frac{d(\Delta S)}{dT}-S \qquad (33)$$

But, from Equation 31, the term

$$T\frac{d(\Delta S)}{dT}=\Delta C_p,$$

and hence

$$\frac{d(\Delta F)}{dT}=\Delta S \qquad (34)$$

It has been already pointed out how the integrated forms of Equations 30 and 31 may be employed in connection with the graphical method to determine ΔH and S (or ΔS) from specific heat data; in the former case by plotting ΔC_p against T, and in the latter by plotting C_p (or ΔC_p) against log T. It is now evident from Equation 34 above that ΔF, the free energy change, may be similarly calculated, i.e., by plotting ΔS against T and determining the area under the curve, since from Equation 34

$$\Delta F=\int_0^T \Delta S dT \qquad (35)$$

Upon comparing Equation 35 with 13 it is obvious that entropy bears the same relation to free energy change that specific heat does to heat of reaction.

Application of the Free Energy Equation to Vaporization of a Solid

In the case of a solid in isothermal contact with its vapor and subjected to an external pressure equal to its vapor pressure, the system is in equilibrium and hence the free energy change $\Delta F=0$. Therefore, for such a system Equation 24 reduces to

$$\Delta H=T\Delta S \qquad (36)$$

where ΔH is equal to the external latent heat of vaporization (L_v).

While the general advisability of employing ΔH, the heat of reaction at constant pressure, instead of ΔE, the reaction heat at constant volume, has been previously mentioned, it is nevertheless better in the present particular case to use ΔE, remembering that $\Delta H=\Delta E+P\Delta V$ (see Equation 5). Hence, Equation 36 may be written

$$\Delta E=T\Delta S-P\Delta V \qquad (37)$$

where ΔE is the internal heat of vaporization and ΔV is the molal volume of the solid minus the molal volume of the vapor. Equation 37 when written in the form

$$P=T\frac{\Delta S}{\Delta V}-\frac{\Delta E}{\Delta V} \qquad (38)$$

and differentiated with respect to T at constant volume leads to the expression

$$\frac{dP}{dT}=\frac{\Delta S}{\Delta V} \qquad (39)$$

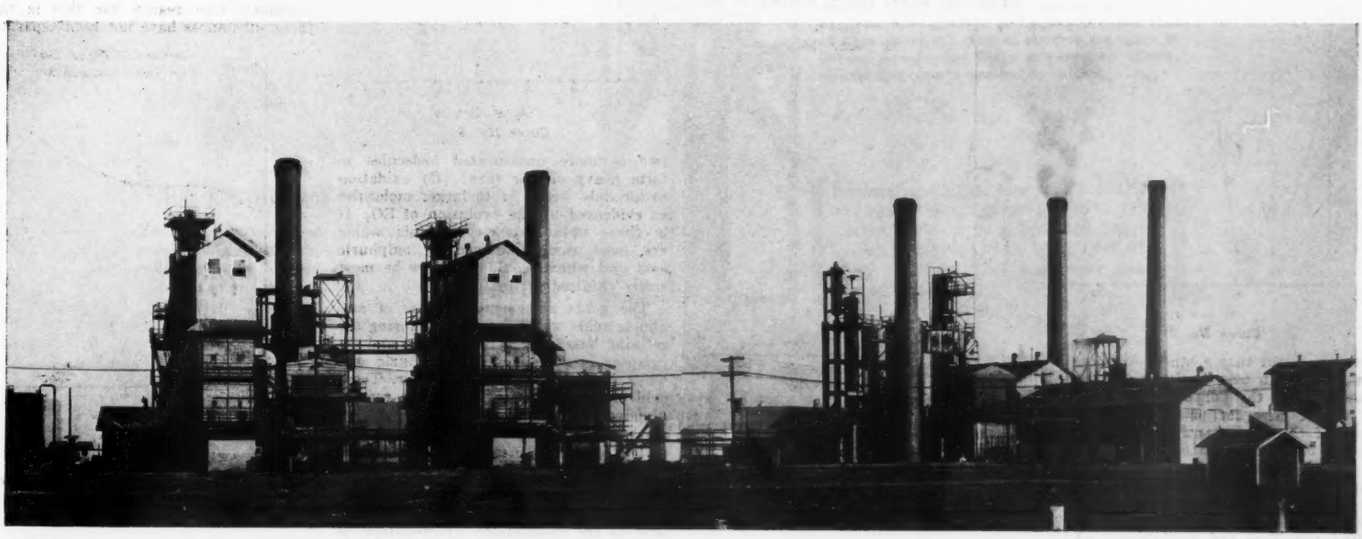
From equation 36:

$$\frac{dP}{dT}=\frac{\Delta H}{T\Delta V}=\frac{L_v}{T(V_s-V_g)} \qquad (40)$$

Equation 40 is the well-known Clapey-

(Continued on Page 286)

ONE OF THE NEW REFINERIES OF THE PAST YEAR



The new refinery of The Texas Company at San Antonio, Texas. Pipe crude unit (right) has capacity of 3,000 barrels daily. Two Holmes-Manley cracking units (left) have capacity of 3,000 barrels daily.

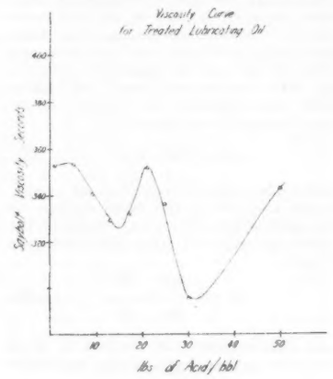
Acid Refining of Naphthene Base Oils

Study of Some of the Facts Required as Foundation for Applying Knowledge to Reactions With Impure Mixtures

By M. K. Thornton, Jr., C. C. Neighbors and J. R. Keith
A. & M. College of Texas, College Station, Tex.

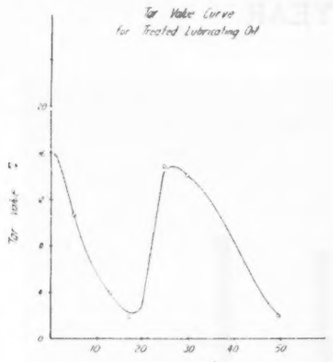
All crude petroleums contain, in addition to hydrocarbons, a number of asphaltic and resinous substances, and oxygen, sulphur, and nitrogen-bearing compounds which must be removed before the oil can be utilized in industrial processes. The separation of such substances and purification of the oil is effected in a series of different processes, which we classify collectively as refining. One stage of refining consists in treatment of a crude distillate or residuum with sulphuric acid followed by washing with caustic soda, washing free from soda and then drying. In order to study some of the changes that this treatment brings about in an oil, the following experiments were made.

In spite of the fact that sulphuric acid



Curve No. 1.

refining is no new process, very little exact information can be had on the mechanics of the reaction. The explanation of this lies in the fact that the action of sulphuric acid on petroleum products is one of the most complicated reactions in all chemistry. Quite a bit of information may be had as to the action of the acid on pure hydrocarbons, but when mixtures of hydrocarbons are treated it is found that new reactions take place, and old ones are catalyzed to



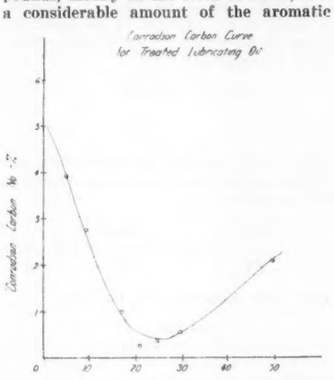
Curve No. 2.

such an extent that a study of the process must begin over again at this point. However, for the purpose of this study, it will be wise for us to cover briefly some of the facts known about the action of concentrated acid on the various hydrocarbons so that we may have some foundation from which to reason when we try to apply our knowledge to reactions with impure mixtures.

The paraffins and naphthenes, which are two of the most important series of hydrocarbons occurring in petroleum are in the pure state dissolved or acted upon chemically by sulphuric acid to a very small extent, but when a member of either series is in the presence of such substances as are acted upon by the acid it has been found that sulphuric acid may dissolve them, and it is possible that some chemical reaction may take place[1-2].

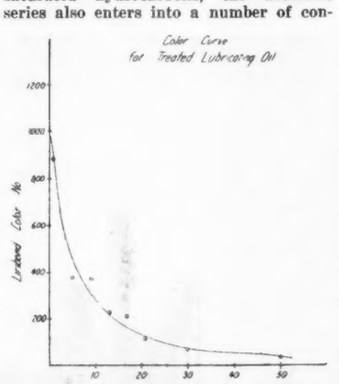
Aromatic Hydrocarbons

Aromatic hydrocarbons are attacked very slowly in the pure state by sulphuric acid at ordinary temperatures. The sulphonic acids which are produced during the treatment of petroleum have most probably another origin and are not produced by the aromatic hydrocarbons themselves[3]. On the other hand when the treatment takes place at higher temperatures, a series of sulphonation reactions do take place. The acid sludge from such treatment contains a large percentage of aromatic hydrocarbon compounds, mostly in the form of acids, and a considerable amount of the aromatic



Curve No. 3.

hydrocarbons themselves. In this case the acid sludge seems to have either dissolved or absorbed selectively a large fraction of the aromatic compounds out of the petroleum. At this higher temperature, a large number of sulphonic and di-sulphonic acids are formed, which all have an important effect upon the final properties of the refined oil. In the presence of olefines and other unsaturated hydrocarbons, the aromatic series also enters into a number of con-



Curve No. 4.

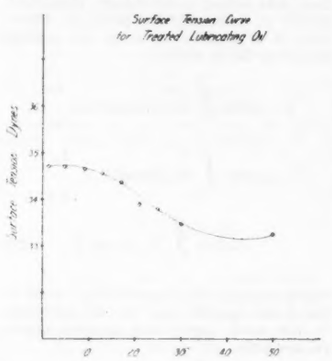
densation reactions, influenced by the presence of the sulphuric acid.

Unsaturated Hydrocarbons

The most important class of compounds which is affected by the refining process is the unsaturated hydrocarbons.

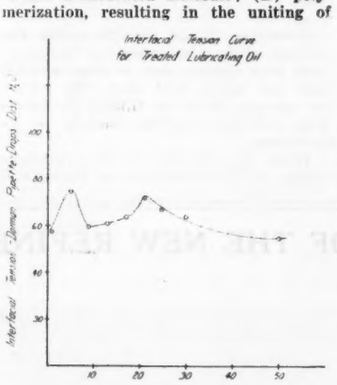
[1]Gurwitsch Petroleum Technology, p. 320.
[2]Gurwitsch Petroleum Technology, p. 322.
[3]Brooks, Non-Benzenoid Hydrocarbons, pp. 63, 102, 136.

A lubricating oil which contained any appreciable amount of unsaturated hydrocarbons would, on standing, undergo a number of internal changes caused by polymerization and condensation reactions, and when heated in use would be so changed as to injure seriously its properties. Thus it is seen that removal of the extremely unsaturated compounds is a necessary step in making the crude lubricating oil fit for use. The principal reactions[4], or types of reactions, which



Curve No. 5.

unsaturated hydrocarbons undergo with sulphuric acid may be classed as, (A) reactions resulting in the formation of acid esters of sulphuric acid or of neutral esters of sulphuric acid by the addition of sulphuric acid to a double bond of the unsaturated molecule; (B) polymerization, resulting in the uniting of


Interfacial Tension Curve
for Treated Lubricating Oil
Interfacial Tension Dynes per cm Against Clean Dist. H2O
lbs of Acid / bbl

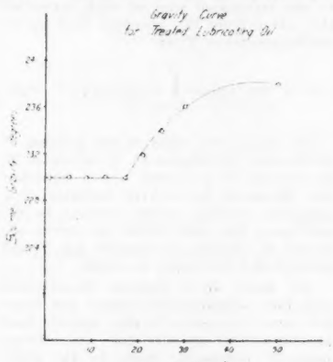
Curve No. 6.

two or more unsaturated molecules to form heavy oils or tars; (C) oxidation to alcohols, acids, or to larger molecules as evidenced by the evolution of SO_2. It is these unsaturated compounds which are most easily oxidized by sulphuric acid and which would therefore be most easily oxidized in use.

The acids and neutral esters of sulphuric acids which are formed during the refining have very little stability and decompose into alcohols and sulphuric acid when they are boiled with water. These acid and neutral esters which do remain dissolved in the oil are difficult to remove and washing repeatedly with caustic soda will not completely effect this removal.

Polymerizing Action

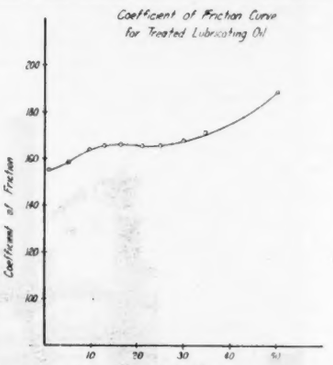
The polymerizing action of sulphuric acid on the unsaturated hydrocarbons is similar to the action of sulphuric acid on any other unsaturated compound. Quite a number of experimenters have investigated the changes which sulphuric acid causes in the specific gravity of oils, all of them concluding that the slight increase in specific gravity which the acid treatment usually caused could only be brought about by polymerization of the unsaturated molecules to form heavier ones which are still soluble in the mixture. Research on the action of sulphuric acid on the pure olefines has been extensive. According to the results obtained by some investigators, pure olefines up to $C_{24}H_{48}$ do not form any tar with sulphuric acid, but do form esters, alcohols, and polymerized products[5]. Other complicated reactions take place when the oil is allowed to stand after the acid treat; the esters dissolved in the oil slowly decompose and dark resinous substances separate. This means that the acid used in the treatment must be neutralized and removed without allowing the oil to stand for any appreciable



Curve No. 7.

length of time after the treatment is finished. Other investigators have found that the olefines with higher molecular weights do not esterify or form alcohols so easily, but the tendency to form polymers increases with molecular weight.

The action of sulphuric acid on the resinous and asphaltic substances contained in petroleum has come in for more dispute than any other class of reactions. One reason for this is that these substances have not been separated



Curve No. 8.

and investigated in their pure form so that little is known about their molecular weight or any of their physical or

(Continued on Page 280)

[4]Brooks, Non-Benzenoid Hydrocarbons, p. 131.

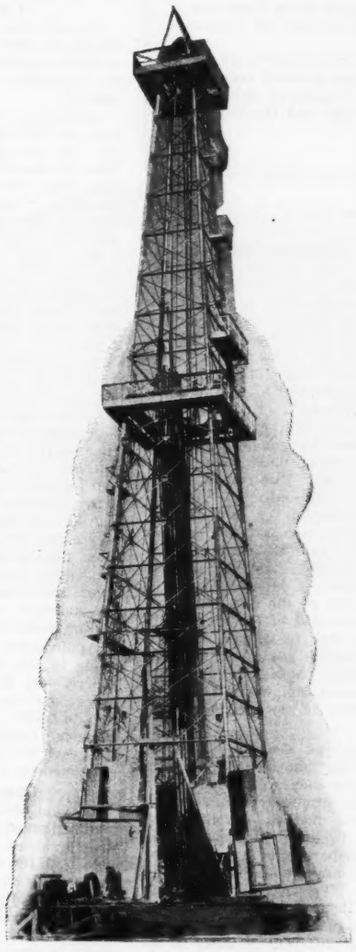
[5]Gurwitsch Petroleum Technology, p. 325.
[6]For interfacial tensions see the work of Langmuir, Harkins and others. Also J.I.E.C. 14-626, J.I.E.C. 14-582 J.

A new derrick, a different derrick, that is

BOUND TO BE IMITATED

the

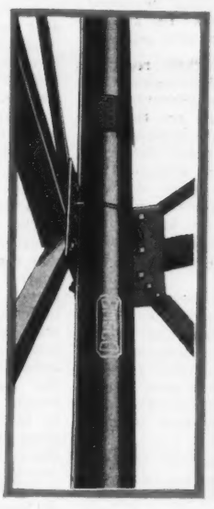
EMSCO HI-TEN DERRICK



was created to utilize the extraordinary qualities of our new HI-TEST Steel to the best advantage. The basic consideration was to give

GREATER SAFE LOAD PER DOLLAR

and the whole derrick was designed from this standpoint - old methods and prejudices were disregarded.



EMSCO HI-TEN Steel - an outstanding development of EMSCO Engineers - has a yield point 150% of that specified by the A. P. I. It is an original contribution to benefit oil operators, making possible better derricks and higher safe loads at proportionately LESS COST.

Others may imitate, and will imitate, but they cannot duplicate the refinements in design, superior construction and material perfection of this derrick. The exclusive features of Emsco design are fully covered by letters patent and cannot be used by others.

THIS IDENTIFICATION IS FOR YOUR PROTECTION

You can identify Emsco Hi-Ten Steel reinforcing by the words "Hi-Ten" stamped on the collar on each length. The collars are also painted bright green.

Patented 1,462,746, July 24, 1923; 1,525,214, Feb. 3, 1925; 1,599,692, Sept. 14, 1926; 1,605,873, Nov. 2, 1926; 1,610,589, Dec. 14, 1926; 1,664,499, Oct. 4, 1927; 1,690,955, Nov. 6, 1928, and numerous other Patents Pending.

Write for the illustrated pamphlet, fully describing its many newly developed features.

EMSCO STEEL EQUIPPED WELLS ARE SAFE

Solving Gum Problem in Motor Fuels

Rate of Distillation Reflected in Amount Present. Preponderance of Constituents Found in Certain Fractions

By H. P. Rue and Ralph H. Espach
Petroleum Chemist, and Associate Petroleum Engineer, Petroleum Experiment Station, Bureau of Mines, Bartlesville, Okla.*

Gums and gum-forming compounds, if they occur in motor fuel, give rise to many refining and utilization problems. Deposits in storage tanks, piping, carburetors, etc., may occur; motor valve stems, especially if the valves leak slightly, may become coated with a sticky gum which impedes their action, and gasoline pump bowls may become discolored.

Refiners have had trouble with gums and gum-forming compounds for many years, especially since "cracked" gasoline has been placed on the market. Vapor-phase cracked products seem to have a greater tendency to form gums than those cracked by the liquid-phase cracking process. The percentage of unsaturated hydrocarbons is usually greater in the products from vapor-phase cracking at higher temperatures than in gasolines produced by liquid-phase cracking processes.

Considerable work has been done by different investigators on gum and gum-forming compounds, but up to the present time it has not been definitely proved just what compounds cause the formation of gums, although it is generally assumed by refiners that the diolefines are the parent substances from which most of the gums in gasoline are formed. It seems probable that there are several different kinds of "gum," each of which is formed in a different manner or from different compounds.

Types of Gum

One type of gum, that which develops when gasoline is evaporated or stored in the presence of air has been studied by Smith and Cooke[1] who came to the conaldehydes formed by the oxidation of olefines or diolefines. Apparently this is not so with all products as the authors of this paper have tested several samples of gasolines that contained gums and other samples that formed gums, and were unable to detect aldehydes. Brooks[2] states that the first step in the formation of gum in cracked gasolines is the formation of organic peroxides and that the gum is merely the end product of polymerized peroxides.

In regard to the gums formed by oxidation Smith and Cooke[3] state:

"The amount of unsaturated hydrocarbons present in a sample of gasoline is usually estimated by determining the solubility of the gasoline in concentrated sulphuric acid. In order to ascertain if the amount of gum that could be made from a sample of gasoline had any relation to the 'unsaturation,' as so determined, a sample was heated for 100 hours in the presence of water with a current of air passing through it. At the end of this time the sample was decanted from the separated gum and then distilled in a current of 'open' steam so that any gum that had formed in the gasoline itself could be recovered. The distillate from the steam distillation was again oxidized in the presence of water for 100 hours, and this process was repeated until more than 7 per cent of gum had been obtained. The 'unsaturation' of the original gasoline was 18 per cent; the 'unsaturation' of the gasoline from which 7 per cent of gum had been made was 17 per cent. This result indicates that there can be no quantitative relation between the so-called 'unsaturation,' as measured by solubility in sulphuric acid, and the amount of gum that can be made. To check this point, two samples of gasoline were prepared. One sample was a distillate boiling between 140° C. (284° F.) and 170° C. (338° F.). This product was thoroughly treated with acid and alkali, and after being thoroughly washed it was steam distilled over caustic potash. It was an absolutely water-white product with an entirely sweet odor. The 'unsaturation' was less than 1 per cent. The second sample was prepared by stilling cracked gasoline over caustic potash. This sample had an 'unsaturation' of 18 per cent. Each of these samples was oxidized by heating under a reflux condenser on a steam bath with a gentle current of air for 300 hours. The cracked gasoline which originally had 18 per cent of 'unsaturation' developed 4.14 per cent of gum, and the 'unsaturation' of the residual gasoline was still 18 per cent. The saturated gasoline developed 0.97 per cent of gum, and in the process developed an 'unsaturation' of 8 per cent.

"These figures confirm those reported above, that there is no direct connection between 'unsaturation' as determined by solubility in sulphuric acid, and the percentage of gum that can be formed from gasoline. It should be noted, however, that the authors have not attempted to measure the amount or kind of "unsaturated' hydrocarbons present in gasoline. The sulphuric acid test is empirical and may indicate the presence of many compounds other than 'unsaturated' hydrocarbons."

The tests just quoted were made under conditions that would not occur in the commercial refining, storage and use of motor fuel. They indicate, however, that while there is no quantitative relation between "unsaturation" and gum formation, nevertheless, the "saturated" material was much more resistant to gum formation.

Other information, however, obtained in the laboratory and from the literature seems to show that certain types of gums are caused or formed from unsaturated hydrocarbons. Treatment of cracked gasolines with acid usually removes the gum-forming constituents; vapor-phase treatment with fuller's earth polymerizes these constituents to higher boiling compounds which are removed from the gasoline vapors by virtue of their high boiling points.

The gum determination methods now in use indicate the amount of gum in the gasoline at the time the test is made, together with additional gum that may develop during the test itself. There is a great difference between the gum content as determined by laboratory tests and the amount of gum formed in gasoline on standing.

Methods of Gum Determination

The two methods commonly used at present are the copper-dish and the steam-oven methods, both of which are in general use by refiners in determining the gum content of gasolines. The copper-dish method is perhaps the most widely used. Dean[4] states that the copper-dish method was devised by F. C. Robinson and his associates of the Atlantic Refining Co. as one of the tests used for aviation gasoline. The copper-dish method as ordinarily run usually shows more "gum" than the actual gum content of the product. This is especially true in products containing sulphur or sulphur compounds, because sulphur and sulphur compounds unite readily with copper and form copper sulphides. As the gum content of the product is determined by the increase in weight of the dish, it is evident that a large part of the increase in weight may be due to copper sulphide. Furthermore, there is a chance for oxidation of the heavier fractions of the gasoline during evaporation, which results in a marked increase in the weight of gum in the dish.

In the steam-oven method devised by Cooke[5] for making gum determinations a sample of the gasoline is evaporated in a glass dish in an atmosphere of steam.

The oxidation method developed by Voorhees and Eisinger[6] determines the gum-forming properties of a gasoline by heating it in contact with oxygen for a certain period. This method will give an indication of the amount of gum that may form in gasoline on standing in storage. Of the different methods so far devised for determining gums in gasoline the glass-dish method as devised by Cooke[7] or with slight modifications seems to be the most reliable. This method gives the amount of preformed gum in the gasoline at the time of test plus that which may form in the gasoline while the test is made. The oxidation method of Voorhees and Eisinger[8] is one of the best methods so far devised to determine the potential gum content of a gasoline.

The amount of gum that will form in a gasoline in storage will depend on the compounds in the gasoline and the length of time it stands in storage. Sunlight accelerates the formation of gums and gasoline exposed to sunlight will develop more gum than if it is stored in darkness. Most investigators agree that it is the preformed gum in a gasoline that causes the most trouble when gumming gasolines are used as motor fuels. This being the case, gasolines that are held in storage for a considerable period of time before use should be so refined that the possibility of forming excessive amounts of gum be eliminated.

Use of Inhibitors

Considerable interest has been shown during the last few months in the use of chemical inhibitors for the prevention of the formation of gums in gasoline in storage.

Apparently considerable work has been done by different investigators along this line but not much has been published. The information available, however, indicates that such antioxidants as a-naphthylamine, hydroquinone, and phenols seem to have the best possibilities along this line.

The rubber industry has done a lot of work on the use of antioxidants and it is possible that considerable information which may be obtained from this source will be of value to the petroleum industry.

Any antioxidant to be of economic value to the petroleum industry must be one that is cheap and powerful so that it is necessary to add only a very small percentage to the gasoline to accomplish the desired result. Tests made by the authors indicate that in general a slow rate of distillation has a most beneficial effect on color stability and on the elimination of gums from gasoline. Polymerization may account for this. In a slow distillation where the vapors are condensed and revaporized often, the color and gum-forming constituents in the gasoline may be changed to higher boiling point products.

Application of this method can be made in the distillation of gasolines in the refinery but the question as to what extent one can reduce throughput in order to make a product requiring less chemical treatment is an economic one that each refiner with his own particular equipment and set-up must work out.

Distribution of Gums

If gum determinations are made on similar gasolines by either the copper-dish or steam-oven method, it is noticeable that the higher the boiling point of the product the higher the percentage of gum, especially in cracked gasoline. However, the amount of gum that settles out when samples of gasoline are allowed to stand in storage does not depend on the boiling range of the product. If a sample of gasoline is fractionated in 10 per cent cuts and gum determinations are made on each cut, the heavier fractions will show the greatest percentage of gum. On the other hand, if these same fractions are allowed to stand exposed to sunlight, some of the lighter fractions may show the greatest percentages of gum and no gum may be formed or settled out of some of the heavier fractions. In addition, the fractions in which the gums form and settle out on standing do not have the same place in the distillation range for all gasolines.

Treated gasolines often show a greater percentage of gums than untreated gasolines; especially if the gasoline has been treated according to the doctor method of sweetening and an excess of sulphur has been added at the time of treating.

Cracked gasolines that have been treated with hypochlorite often show a

(Continued on Page 286)

FACTORS IN GUM FORMATION

There are two or more kinds of gum in gasolines and apparently one kind can form without affecting the unsaturation of the gasoline (as determined with sulphuric acid).

The rate of distillation or fractionation has an effect on the amount of gums formed in the gasoline and it is believed that polymerization takes place during a slow distillation, so that the polymerized products may be separated by virtue of their boiling points.

A preponderance of gum-forming constituents occurs in certain fractions of a gasoline and it is possible to segregate these fractions. It is thus possible to separate the gum-forming fractions of a gasoline and treat each fraction as needed.

As the fractions containing the gum-forming constituents do not have the same distillation range for all gasolines, no general rule can be followed in fractionating gasolines, but it is necessary for each refiner to make a study of the distillates he is using and fractionate accordingly.

*Published by permission of the director. United States Bureau of Mines (not subject to copyright).

[1]Smith, N. A. C., and Cooke, M. B., Gum-Forming Constituents in Gasoline. Bureau of Mines Reports of Investigations, Serial No. 2,394, September, 1922.

[2]Brooks, B. T. The Chemistry of Gasolines. Ind. and Eng. Chem., Volume 18, No. 11; November, 1926, Page 1,198.

[3]Smith, N. A. C., and Cooke, M. B. Work cited.

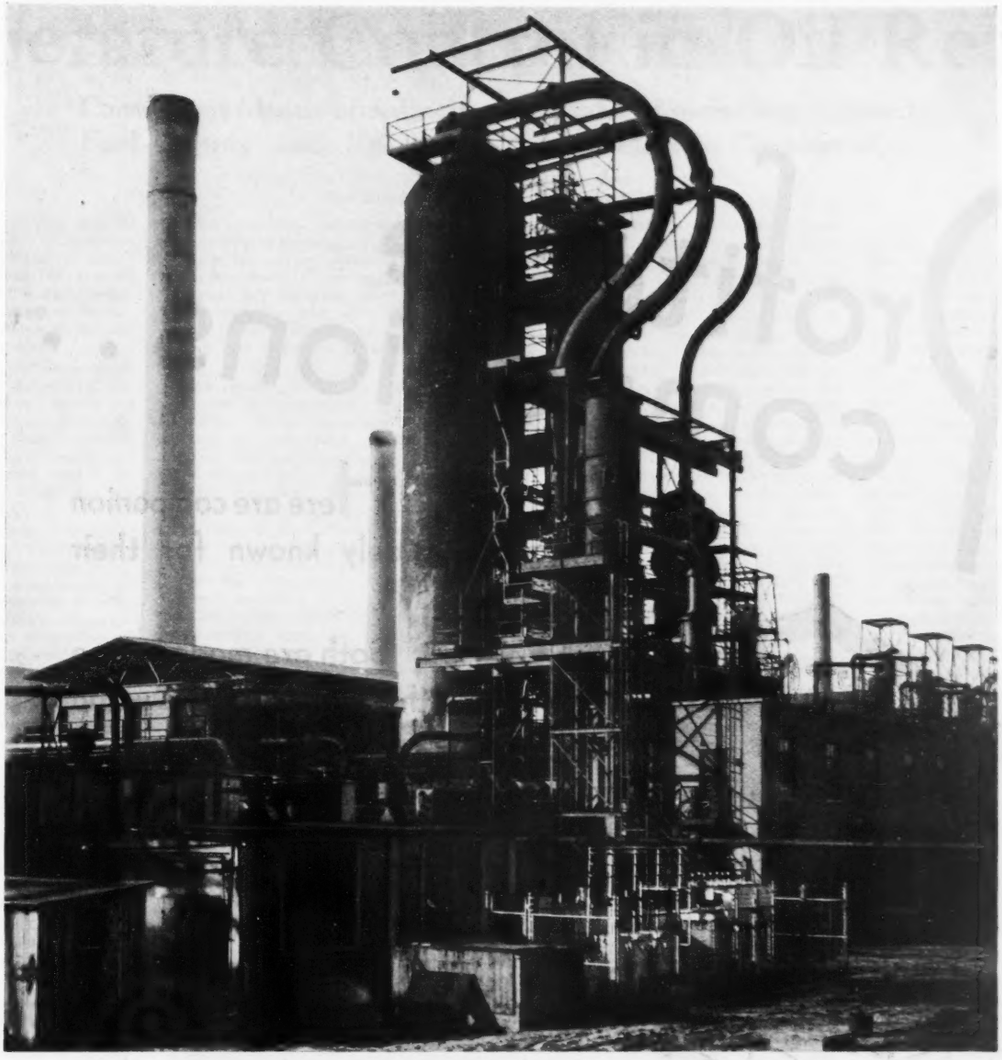
[4]Dean, E. W., Motor Gasoline Properties. Laboratory Methods of Testing and Practical Specifications. Bureau of Mines Technical Paper 214, Page 25.

[5]Cooke, M. B. A Convenient Method for Determining Gum-Forming Material in Gasoline. Bureau of Mines Reports of Investigations, Serial No. 2,686, May, 1925.

[6]Voorhees, V., and Eisinger, J. O. The Importance and Significance of Gum in Gasoline. American Petroleum Institute Bulletin 1,929-10, No. 2, 169.

[7]Cooke, M. B. Cited.

[8]Voorhees, V., and Eisinger, J. O. Cited.



Complete Refinery Units

The two stage Foster Wheeler distillation unit shown above will fractionate 7500 barrels of crude per day. Ten products are continuously recovered to specification.

Foster tube stills are shown at the left directly behind the fractionating towers. The heat exchangers are placed on platforms in front of the towers and above the roof of the pump and receiving house.

This distilling unit was designed and constructed by the Foster Wheeler Corporation.

FOSTER WHEELER CORPORATION
165 Broadway, New York, N. Y.
Branches in Principal Oil Centers

Foreign Associates:
Societe Anonyme Foster Wheeler; Paris, France.
Foster Wheeler Limited; London, England.
Foster Wheeler Limited; Toronto-Montreal, Canada.

FOSTER WHEELER

Profitable companions . .

Here are companion products widely known for their excellence.

NevrNox ETHYL

Both are made in one refinery—the largest in the world operating exclusively on high gravity crudes—from selected crudes.

DIAMOND 760 MOTOR OIL

NEVRNOX ETHYL is a highly responsive, active, "peppy" fuel. DIAMOND 760, a pure 100% paraffin base lubricant, leads all commercial motor oils in heat-resisting qualities.

Either NEVRNOX ETHYL or DIAMOND 760 offer unusual profit opportunities to distributors. Together they present a combination without an equal on the market today! Write, wire or phone for particulars!

MID-CONTINENT PETROLEUM CORPORATION

General Offices: Tulsa, Oklahoma

Chicago . . . . Kansas City . . . . St. Louis . . . . Waterloo

Temperature Control in Oil Refining

Convenient Means of Adjustment, Stable Operation, Correct Fuel Supply and Reasonable Cost Factors in Consideration

By R. D. Bean
The Brown Instrument Co., Philadelphia, Pa.

No attempt is made, in this article, broadly, to cover the subject of temperature control in the oil industry. It represents merely an outline of the general characteristics of control requirements, accompanied with some remarks on the application of control methods to the operation of furnaces and towers.

The general discussion on temperature control will apply to the majority of the systems used in oil refining. While the opinions expressed are based primarily upon experience with a Cross cracking unit the statements will be generally applicable to almost any process used in oil refining and particularly to tubular oil heaters and cracking units.

Closeness of control is naturally desirable and is the real object in view, but it must be accomplished without sacrificing other factors which are also a measure of its success. Closeness of control is commonly used as a measure of the comparative merits of two methods or systems of control, because it is a convenient way of comparing the final results obtained, but the fact must not be overlooked that the method of obtaining the final results plays an important part in determining the commercial success of such a system.

Satisfactory control involves other important features, as well as maintaining the temperature within certain limits. One type of equipment may control temperature as well as a second type, or even better, and yet be very unsatisfactory, whereas a second control will be successful from the operator's point of view and will be of material assistance in the practical operation of the unit.

Factors to Be Considered

Among the factors, other than closeness of control, which must be carefully considered in applying any system of automatic temperature control are the following:

Easy and convenient means of adjustment.

Capacity to maintain stable operation with little attention.

Correct adjustment of fuel supply.

Reasonable cost.

The factor "easy and convenient means of adjustment" is placed at the head of the list because experience has shown that in many applications it can very easily mean the difference between success and failure.

The operation of oil refining units requires the proper handling of many details, including the control of different variables. Some of these variables can be handled better by a properly designed automatic controller than by manual adjustment, but an operator watching the over-all operation of the unit, may find it necessary to change the adjustment of the automatic controller from time to time on account of some other surrounding condition. Automatic temperature control, particularly in the oil industry, is primarily for the purpose of assisting the operator and making it more convenient for him to maintain the different variables where they will produce the best results in practical operation. The development and the design of automatic control equipment must be based upon this fact. It must assist the operator, not supplant him, and the real operation of the unit must be left in the hands of the operator. Automatic control equipment can not think, it cannot take into account unusual conditions which should modify its action, and a little reliance on the intelligence of the operator to assist the automatic equipment will do much to insure its ultimate success. An operator will overlook imperfections in control equipment or even occasional failure of the equipment to take care of certain unusual conditions, provided he finds it easy to help it through its difficulties or to make one or two simple adjustments to the equipment, if necessary. If the adjustments are inconvenient to make, or complicated, he will naturally do the easiest thing, which is to shut off the control and make his adjustments manually.

"The capacity to maintain stable operation with little attention" is placed next on the list. If the equipment is properly designed for convenient adjustment, the operator will not object to making occasional adjustments, but if the equipment requires mechanical changes in adjustment for every small change in operating conditions, he soon learns that instead of helping him, the equipment has made additional work for him, and he naturally decides that hand control is preferable.

The importance of the third factor, "correct adjustment of fuel supply," depends largely upon the application. In some cases the magnitude of the fuel corrections, or the frequency of these corrections, is relatively unimportant, so long as the temperature is held within the desired limits. In other cases, the rate of fuel change and the magnitude of the individual corrections are of the utmost importance and may not be secondary to the actual temperature variation.

Control board in modern refinery.

"Reasonable cost" is placed at the end of the list, not because it is unimportant, but because it is a relative term. What is reasonable cost in one application is prohibitive in another, and the advantages of automatic control over manual control must be weighed against the cost. Many times this becomes an engineering compromise and results in the selection of less expensive equipment which, while satisfactory enough for all practical purposes, lacks the additional refinements of a more expensive equipment that do not justify their added cost.

Fundamental Principles

Any control mechanism, to be complete, must possess two distinct operating characteristics. It must respond rapidly in opposition to any change that takes place and it must respond more gradually to any tendency for the condition to assume any value other than the desired normal value.

The first characteristic is a stabilizing element which quickly opposes any change in the quantity being regulated, regardless of whether the change be in the wrong direction (away from normal) or in the right direction.

The second characteristic consists in an element which responds slowly to the value of the quantity being regulated, and which has in itself no stabilizing characteristic. The function of the second element is to readjust the stabilizing element continually. Any control apparatus that does not possess both of these operating characteristics will be either inaccurate in the exact maintenance of the value desired, or it will produce a hunting action above and below the temperature desired.

There are many control mechanisms on the market that possess one or the other of these two operating characteristics, but there are few that possess both of them. In order to simplify the descriptions of the various types of control mechanisms, we have adopted the use of the terms "follow-up" and "compensator." A follow-up control is one that possesses the first characteristic, i.e., it responds quickly to any change in the quantity being regulated, always in opposition to the trend of the change of that quantity. The term "compensator" is used to designate the second element which responds to the direction of departure of the value of the quantity being regulated from the normal value (above or below) and continually readjusts the first or stabilizing element.

A simple follow-up control is the type usually found in the various mechanical regulators. For purposes of illustration we can imagine a metal rod in a furnace, which has small thermal capacity and can respond quickly to changes in the furnace temperature. The expansion of this rod could move a fuel valve and the movement of the fuel valve would correspond to the expansion and contraction of the rod. If the temperature should rise rapidly the rod would expand rapidly and the fuel supply would result in the rod contracting rapidly and opening up the fuel valve rapidly. By properly proportioning the valve opening we could produce a true follow-up control which would vary the fuel supply according to the trend of the change in temperature.

The simple follow-up control would fail to hold the temperature at the exact point desired because after having departed from normal to move the valve to a new position it cannot again return to normal as long as the valve must be held in its new position. Control by means of the compensator mechanism only would produce an accurate average temperature but the quantity being regulated would continually hunt above and below the desired value.

A pyrometer movable coil does not have sufficient power to move a direct-connected vale. The follow-up action must, therefore, be obtained by some indirect means and we accomplish this by a motor and by shifting the contact table whenever the temperature changes. With a small time interval between successive depressions we can approximate a follow-up control by moving the valve in small increments after each depression and, after having made this movement, leaving the valve in that position until the temperature changes again.

The compensator effect may be easily produced by an ordinary low and high contact device, which operates at intervals, and which can shift the relative positions of the control table and the valve.

Furnace Control

The general statements which are made in the following paragraphs are based upon experiments with a power specialty furnace on a Cross cracking unit. They will probably apply to the majority of furnaces used in the oil industry and particularly to tubular oil heaters.

Our experience has indicated that the most practicable form of control equipment for a large furnace consists of a single mechanism operating a fuel oil valve which is in a common supply line to the several burners. The fireman manually balances the fires so that the furnace temperatures are equalized, and the control mechanism controls the flow of fuel to the group of burners. The furnace control instrument should be connected to two or more thermocouples in series in order to measure the average furnace temperature.

The single fuel oil valve attached to the mechanism must be capable of a wide range of fuel adjustment so that it can take care of any operating condition from the lowest to the highest temperatures desired.

On furnaces which are fired from two sides we would recommend the arrangement of a common fuel supply line, one for each group of burners, and a valve mechanism and separate control instrument for each common supply line. This arrangement allows the fireman to maintain the temperatures of the two ends of the furnace slightly different, if he desires to do so, and gives him a flexible arrangement.

The objection is frequently raised by operating men that with a tube still furnace under automatic control, flame impingement may occur for long periods of time without being detected by the fireman. There is no practical way in which the recorder in the control house can be made to indicate an improper flame condition at any of the burners. Furthermore, a correct temperature, as shown in the control house, does not necessarily indicate a correct firebox condition. With these facts in mind, we believe that the successful furnace control equipment will be one which requires that the fireman watch the condition of his fires but which assists him to maintain a constant average heating effect on the oil. On the Cross cracking unit for example, the fireman has his standard six-record furnace

(Continued on Page 203)

New Type Knock Testing Apparatus

"Series 30" Unit of the Ethyl Gasoline Corp. Has Improved Instrumentation to Secure Greater Speed and Accuracy

Engineering Department, Ethyl Gasoline Corp.

The Ethyl Gasoline Corp. is now producing for its laboratories and those of its customers a new type of knock testing apparatus (Series 30) which has been developed as a result of nine years of experience in the rating of the antiknock properties of automobile and aviation motor fuels. It has always been the policy of this company to improve its knock testing apparatus constantly without introducing radical changes of equipment or methods. For several years improvements were made from time to time on apparatus which was the outgrowth of improvised Delco lighting engines.

The new apparatus is not fundamentally different from the old but only one piece of the old is used in the construction of the new machine. Testing methods have not been changed except by improvement of instrumentation to secure greater speed and accuracy. The new apparatus is a universal unit suitable for testing automobile and airplane engine fuels under the wide range of temperatures and pressures encountered in these engines and antiknock ratings made with it have shown complete agreement with ratings made by actual operation of automobile and airplane engines. The new specifications for United States Army aviation Ethyl Gasoline require the use of the new Ethyl Gasoline Corp. testing apparatus with certain definite engine conditions.

Description of Unit

Figure 1 shows the new unit installed and ready for use. Figure 2 shows the details of the cooling system and generator drive. The unit consists of a heavy cast iron base on which are mounted the engine, synchronous generator and cooling system, together with a control panel

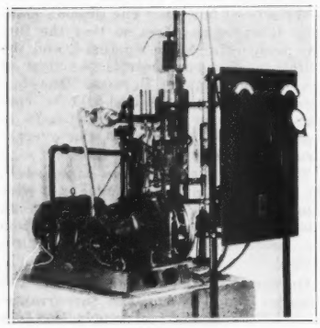


Figure 1—"Series 30" knock testing apparatus installed and ready for use.

which carries the instruments and control switches. A concrete foundation 38 inches by 41¼ inches by 26 inches high is required for the engine assembly which is shipped with all accessories properly mounted on the cast iron base. All wiring is carried in flexible conduit in the base and the only wiring required during the installation of the apparatus is the connection to the panel of the wires in two pieces of flexible conduit furnished with the engine and of the leads from the power supply lines to the synchronous motor starter switch on the panel.

The bore of the engine is 2½ inches and the stroke 4⅝ inches. On account of its small size the engine uses only a very small quantity of fuel in a long period of time, hence small samples may be accurately tested and expensive standardization fuels may be used quite economically.

The cylinder and cylinder head are exceedingly well cooled, the water passages in both being of large size. Valves, spark plug, bouncing pin opening and both intake and exhaust ports are entirely surrounded by cooling liquid and the formation of vapor pockets is prevented by the rapid flow of the cooling liquid maintained by the circulating pump. Because of the efficient cooling there is no preignition tendency even when aviation fuels are tested at 400° F. jacket temperature. The complete absence of large uncooled surfaces in the combustion chamber reduces to a minimum the duration of the unsteady state immediately following a change from one fuel to another of entirely different characteristics.

In as much as the engine is designed to operate primarily at speeds not in ex-

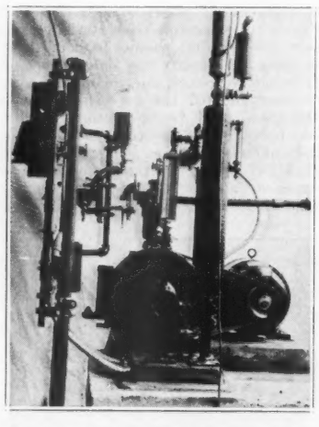


Figure 2—Details of cooling system and generator drive.

cess of 1,000 revolutions per minute the valves are small and the exhaust valve is lubricated by a simple yet efficient lubricator which requires filling at intervals of a few weeks. The special aluminum piston is made quite heavy for efficient heat dissipation and the rings are designed to control the quantity of oil supplied to the cylinder walls.

The connecting rod is quite heavy and has a big-end bearing diameter of 2 inches. The crankcase is specially designed to house three large ball bearings which support the extra heavy crankshaft which has a diameter of 2 inches. A dipper on the connecting rod bearing dips oil from the crankcase and splashes it onto the underside of the piston. Camshafts for high and low speed operation are available and when it is desired to change the camshaft it is necessary to remove only two small screws and to loosen another without disturbing the crankcase in any way.

The flywheel weighs 200 pounds, its inertia causing the crankshaft to rotate at practically constant angular velocity during the four cycles of engine operation. Grooves for the V-belt drive for the synchronous generator are milled directly into the flywheel.

The ignition system is specially designed to maintain constant spark advance at all times and furnish a spark of sufficient intensity to fire the charge at any compression pressure which may be obtained on the engine. A pivotless breaker of the aviation type is driven directly by the crankshaft. The absence of backlash characteristic of camshaft ignition drives and the elimination of all pivot bearings in the timer mechanism permit the maintenance of any desired spark advance within a very small fraction of 1°. A neon tube spark protractor of large size forms an integral part of the breaker mechanism and an adjusting screw is provided for the regulation of the spark advance.

Engine Power

Engine power is absorbed by a special alternating current synchronous generator which also cranks the engine. A special 70-volt direct current winding in the generator supplies direct current for the ignition system and for the operation of the knock measuring instruments.

Easily removable V-belt generator pulleys are available in several sizes to permit operation at different speeds. A spline is set into a milled groove in the cast iron base and engages a similar groove in the base of the synchronous generator. The spline maintains the generator in proper alignment with the flywheel while pulleys are changed or the belts tightened. A simple adjusting screw permits the maintenance of the desired tension on the belts. The feet of the generator are slotted and provided with clamping screws.

The cooling system provides the advantages of both evaporative and circulated liquid cooling. A long liquid column attached to the cast iron base supports a reflux condenser. A circulating pump, directly driven by the crankshaft, forces 8 gallons of liquid per minute into the lower jacket connection. Since the liquid in the system is always maintained at its boiling temperature, the heat absorbed by the liquid in passing through the cooling jacket generates bubbles of vapor. The mixture of liquid and vapor passes from the cooling jacket into a separating chamber in the cooling liquid column and the vapor is condensed by the reflux condenser.

Testing Temperature

A jacket temperature of 212° F. is used for testing automobile fuels and a

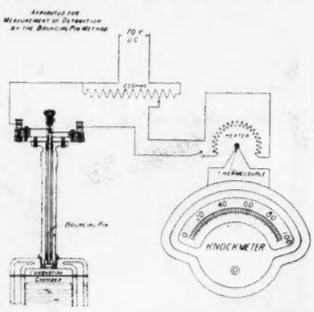


Figure 3—Bouncing pin circuit with knock indicating instrument.

temperature of 350° F. for aviation fuels. The higher temperature is secured by a mixture of ethylene glycol and water. Since the temperature of the vapor phase of a mixture of ethylene glycol and water is changed very much by a small change in the percentage of water present in the liquid, it is necessary to be able to control the concentration of water quite closely to obtain a jacket temperature of 350° F. A three-way cock mounted on the top of the condensing column permits the vapor from the cooling jacket to be fed into a spiral fractionating column having an equivalent length of 8 feet of straight flat tubing. Excess water may be evaporated off until the desired boiling temperature is obtained, without the loss of ethylene glycol. When the desired temperature is reached the three-way cock may be turned to permit the vapor to pass into the reflux condenser, after which the desired temperature is automatically maintained.

On account of the large temperature difference between the outside air and the cooling liquid when high jacket temperatures are used, it is impossible to maintain a temperature of 350° F. by engine heat alone if throttle openings of less than 8 degrees are used. To permit operation of the engine at very small throttle openings, a three-heat immersion heater is inserted in the cooling liquid line between the engine cylinder and the liquid column. With the switch on the "low" or "intermediate" positions the heater may be used to supplement the heat supplied by the engine to raise the liquid to its boiling temperature and with the switch on the "high" heat position the heater may be used to secure rapid warming up of the engine.

The liquid column is insulated with 85 per cent magnesia covering and pre-

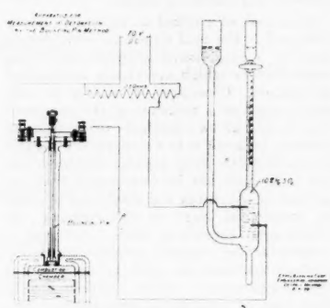


Figure 4—Bouncing pin circuit with electrolytic cell.

vents the temperature of the liquid falling below the boiling temperature while it is in the column. An armored mercury thermometer with open scale is screwed into the line which connects the pump with the cooling jacket of the engine.

The fractionating column may also be used to secure a temperature of 212° F. in regions of high altitude where water alone boils at a considerably lower temperature.

Control Panel

The control panel carries the magnetic starter for the synchronous motor, tach-

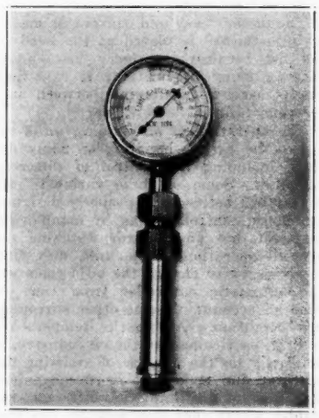
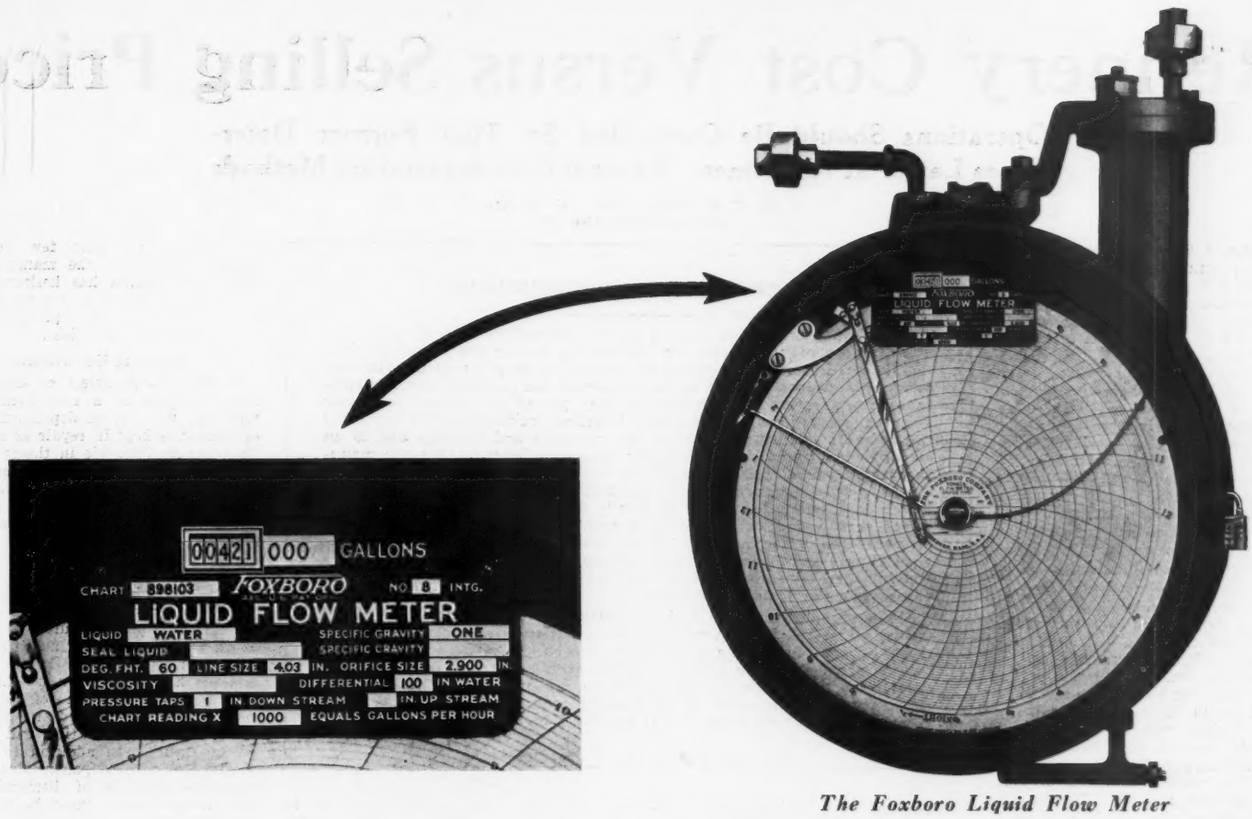


Figure 5—Standard compression pressure gauge for use with knock testing apparatus.

ometer indicator, electrolytic cell, knock intensity meter (described below), stop clock, a fixed-tap resistance for supplying 6 volts to the ignition system, and a variable voltage resistance for the knock measuring instruments, as well as the necessary control switches and fuses.

After several years of research in cooperation with one of the prominent electrical instrument manufacturers, an integrating apparatus has been developed which indicates continuously the average

(Continued on Page 292)



The Foxboro Liquid Flow Meter

It Reads Like a Speedometer

WITH a Foxboro Direct-Reading Liquid Flow Meter you can know accurately the total flow and the rate of flow in your pipe lines without computation.

It shows both how fast the liquid is flowing and how much has already passed.

The chart accurately shows the rate of flow.

The total flow is mechanically computed by the integrator which is as easy to read as a speedometer.

Chart computation is no longer necessary. The integrator does the job for you.

Let us explain the Instrument and application further. There is a Branch Office near you.

THE FOXBORO COMPANY
Neponset Avenue, Foxboro Mass., U. S. A.

28 North Guthrie Ave., Tulsa, Okla.
Magnolia Building, Dallas, Tex.
J. E. Treacy, Strada Golesti No. 9, Ploesti, Roumania

FOXBORO
REG. U. S. PAT. OFF.
THE COMPASS OF INDUSTRY

New York Chicago Boston Philadelphia
Pittsburgh Cleveland Rochester, N. Y.
Atlanta Los Angeles San Francisco
Salt Lake City Portland, Ore. Detroit
Peacock Brothers, Ltd., Montreal, Canada

Instruments for Controlling, Recording and Indicating Temperature, Flow, Humidity and Pressure

Refinery Cost Versus Selling Price

Operations Should Be Controlled So That Former Determines Latter at All Times. Explain Cost Accounting Methods

By F. E. Holsten and C. E. Votrian
Barnsdall Refineries, Inc.

An executive should be familiar with what the operating costs are whether he operates at 100 per cent capacity or at lower capacities. He should also know that he has a system of arriving at his costs which will give him a clear insight into what makes up his costs. He should know whether depreciation or obsolescence is taken care of. He should know what departments are producing high costs and whether it is advisable because of this to replace with new or more modern equipment. If it is essential that he know these things, it is self-evident that the refinery manager, the superintendent and foreman know them also. Only in this way can the way be made clear for corrections or replacements.

A number of associations, both national and sectional are now paying more than passing attention to the end of arriving at a correct and uniform system of costs. The American Petroleum Institute have such a department. At the manufacturer's committee meeting of the Western Petroleum Refiners Association, held in Tulsa in October, 1929, a paper was read dealing with this subject and considerable interest was shown and a lengthy discussion had. The system discussed in this paper is the same as that discussed at that meeting. We do not claim it is the one that should be adopted but we do believe it the best we know and feel it will give a clear insight into all refinery operations.

Allocating Costs

At this time there is a decided difference of opinion as to the method of allocating costs to the various refined products produced from crude oil. All of the methods in use today are based on the market value of the refined products and good arguments are advanced in support of each method; however, there are also disadvantages to each. Regardless of the method used, it is essential that all costs be taken into consideration and that the profit applied to the various products, or loss, whichever the case may be, agrees in total with the profit or loss as shown in the finished operating statement. With the present day price of crude oil and refined products, using actual operating costs, the per gallon cost of gasoline, by three (3) of the most popular methods of determining costs, shows but a slight variation; that variation being in the hundredths of a cent per gallon which would have no material effect on a selling price which is based on a fair profit above cost.

All costs of operating a refinery, including depreciation of the equipment in use and an allowance for obsolescence, should be taken into consideration in determining the cost of gasoline and other refined products. In skimming and cracking plant operations the variation in cost as computed by the different refiners is mainly accounted for by the method used in handling depreciation and obsolescence. Other variations in costs are accounted for by the method used in distributing refinery office and general plant expenses and in the handling of charges for extraordinary repairs, changing equipment and dismantling.

Depreciation and obsolescence is the subject of discussion wherever cost figures are considered. Regardless of how depreciation and obsolescence are handled on the profit and loss statement by the refiner, these charges should not be ignored in determining the cost of the various refined products. It is true that depreciation is not an exact figure but it does not have to be a wild guess. Depreciation based on complete detailed investment records and past experiences can be made fairly accurate. Obsolescence is something that has happened in the past, is happening now, and will continue to happen so long as new and improved methods of refining crude oil are discovered. Past experience has proven that obsolescence is a cost that cannot be ignored. Loss due to obsolescence can be anticipated by making provision in the cost figures before it actually happens or by distributing costs due to obsolescence after it has happened over future years by continuing to depreciate equipment which is not in use. Because of the narrow margin of profit, which at times in the past few years has changed to a loss, the management of refining companies has hesitated to include this unknown factor which would increase their costs and probably change a small profit into a loss.

Figuring Depreciation

By those who object to depreciation being included as a cost item we are told that there is no depreciation when equipment is kept in repair at all times. That sounds plausible in theory, but we all know from actual experience that unless the equipment is kept in repair it would last but a very short time and the depreciation rates used should take into consideration maintenance of the equipment in operating condition. Past experience is the best guide in determining the depreciation write off and that experience proves without a doubt that the various kinds of equipment will last on an average a certain number of years if kept in repair at all times. Past experience has also shown us that equipment is replaced by more efficient equipment which gives rise to an obsolescence charge and this condition will continue in the future. In addition to the loss on investment equipment due to obsolescence the cost of dismantling, less the salvaged value, must be taken into consideration.

If depreciation and obsolescence costs are ignored in determining the cost of the finished products from crude oil, refiners can expect to show a loss from operations, if the selling price is based on costs so determined. The refiners at this time are confronted with a price situation for gasoline and other refined products that apparently is not based on costs and these products are being marketed at an inadequate profit or a loss, but this is a condition that will have to be corrected by other means which is not the intention of this article to discuss.

By-Product Method

The accompanying statement showing the cost of gasoline determined by the by-product method is based on a combined skimming and cracking plant of 5,000 bbls. a day crude oil capacity with balanced skimming and cracking operations and the most efficient processing method which has come to our attention. The figures used are based on the plant operating to capacity not taking into consideration charges for obsolescence and the expense necessary in connection with the dismantling of obsolete equipment. The skimming and cracking operations are considered as a unit for determination of costs to avoid complications which would arise because of the distribution of the expense of certain departments between skimming and cracking operations. The yield plainly shows the plant to be operated for the purpose of recovering as much gasoline as is possible from crude oil using the bottoms, which is designated as pitch fuel, to operate the plant, leaving for sale but three (3) products, the bulk of which is gasoline. For this type of operation the by-product method is the logical method to use. The by-product method is based on the theory that all products, excepting gasoline, are incidental to the production of gasoline and the amount realized from the sale of the by-products is considered a reduction of the cost of producing gasoline.

The crude oil run is 39 gravity Seminole crude at the price in effect prior to the recent change. The pipe line charge is probably below the average paid by the majority of refiners. Total operating and maintenance costs of 49

(Continued on Page 296)

PROFIT AND LOSS IN REFINING

The most important results to the executives and directors of our refinery organizations are summed up in the one word—profits. The profits are determined by volume, sales price of the finished product, and cost. Judged by the situation the refining industry now faces, the greatest importance has been placed on volume and more volume. Regardless of how much finished product may be available the refiners continue to run to full capacity and thereby add to an already oversupply. When will the lesson be learned that the manufacture of more finished products than the consumer can consume means a lower return for the product sold? Volume may mean a lower cost, but unless there is steady demand it also means a much lower return and consequently a much smaller profit, and, in all probabilities, a decided loss. How much better to more evenly balance supply with demand, and, although a somewhat higher cost is shown, thereby show a better refinery profit by obtaining better values for the finished product.

When conditions are bad the refinery manager is very often unjustly criticised, when as a fact, it is often the result of the executive's orders for volume production, and the price he orders quoted to the prospective customers. Very often he is not familiar with what it costs to manufacture and place his product in the hands of the consumer. Certainly if he was, he would hesitate before continuing on a volume basis and at a price which is ruinous.

BY-PRODUCT METHOD OF DETERMINING COST OF GASOLINE
Net Ultimate Yield After Deducting Treating, Handling and Shipping Losses

	From skimming 150,000 bbls. crde		From cracking 27,000 bbls. gas oil 60,000 bbls. topped crude		From total balanced skimming and cracking operation	
	%	Bbls.	%	Bbls.	%	Bbls.
Gasoline	37	55,500	57	49,500	70	105,000
Kerosene	2	3,000	..	.....	2	3,000
Gas oil	18	27,000	..	.....		
Topped crude	40	60,000	..	.....		
Salable fuel oil			19	16,500	11	16,500
Pitch fuel			12	10,500	7	10,500
Loss	3	4,500	12	10,500	10	15,000
Total	100	150,000	100	87,000	100	150,000

Bbls.		Unit value	Amounts	
150,000	Crude oil (39 gravity)	$ 1.60	$240,000.00	
	Pipe line charge	.15	22,500.00	$262,500.00
		$ 1.75		
	Operating and maintenance costs:			
	Skimming plant	$ .11	$ 16,500.00	
	Cracking plant	.24	36,000.00	
	Depreciation	.14	21,000.00	
		$ .49		73,500.00
	Total crude and mfg. costs	$ 2.24		$336,000.00
	Deduct: Realizable value of by-products:			
3,000	Kerosene	$1.80	$5,400.00	
16,500	Salable fuel oil	.75	12,375.00	
10,500	Pitch fuel burned	.75	7,875.00	
32,600	M. cu. ft. fuel gas, per M.	.15	4,890.00	$ 30,540.00
	Less: Pro rata marketing expense:			
19,500	Shipping	$ .015	$ 292.50	
19,500	Selling	.05	975.00	
19,500	General	.05	975.00	2,242.50
	Net realization from by-products			28,297.50
	Net cost of gasoline from crude			$307,702.50

		Per bbl.	Per gal.
105,000	Cost of gasoline (4,410,000 gal. U.S.M.)	$2.930	$.0698
	Add: Shipping expense	.015	.0003
	Cost of gasoline leaving refinery	$2.945	$.0701
	Average selling price U.S.M. gasoline	2.730	.0650
	Excess of cost over selling price	$ .215	$.0051

Loss on sale of 4,410,000 gal. gasoline, @ .0051 per gal.	$ 22,491.00
Add: Selling expense, @ .05 per bbl.	5,250.00
Administration and credit expense, @ .05 per bbl.	5,250.00
Total loss per month	$ 32,991.00
Total loss per year	395,892.00

PACKED

into every JEFFERSON UNION

EVERY Jefferson Union is crammed full of goodness. The factors that insure maximum strength, maximum tightness and maximum durability run like steady streams into the manufacture of these superior fittings.

Chief among these factors is air-refined, Certified Malleable Iron, from which Jefferson Unions are made. Through the use of this strictly standardized iron, Jefferson Unions are uniform in quality and tensile strength, which far exceed all ordinary requirements. The finest brass obtainable goes into the seat ring, which is protected from abrasive and corrosive contacts by its location in a recess away from the runway of the fitting. Ground-ball, brass-to-iron joints are ground in pairs and never separated. They seat easily, the brass becoming as one piece with the iron and absolutely tight. Play between nut and swivel-end provides easy application even when pipe stems are out of alignment. Furnished with iron to iron joints, (as well as brass to iron) at no extra cost, when specified for use in fields where a highly corrosive condition exists.

Handled By All Leading Oil Industry Jobbers

Jefferson Union Company

Lexington, Mass. Sales Offices: 11 W. 42nd St., New York City

JEFFERSON

Remove Acid Sludge With Centrifuges

Process Applicable to All Petroleum Distillates. Requires Less Chemicals. Yield of Treated Products Increased

Research Department, Smith Engineering Co.

One of the most recent developments in the art of petroleum refining is the process of continuous acid treatment involving a centrifugal separation of the acid sludge. The process has been perfected by the Smith Engineering Co., operating under the Cross Development Co.'s patents.

This process is now in commercial use and is applicable to any type of petroleum fraction; the simplest system being that used for the treatment of gasoline and like materials.

In order to obtain a true picture of the merits of the process, we should probably study for a moment the purpose of acid treatment and the nature of the problems involved. In the treatment of gasoline, the most universal indication of satisfactory results has been the finished color. This has, by no means, been the only measure of good work for we have long recognized the presence of certain compounds, some of which cause the gasoline to be corrosive, others forming undesirable polymers or gums.

Processing of Bright Stock

In the case of heavier fractions, especially those producing bright stock, color has again been the primary indication of purity. This coloring material seems to be in the form of compounds having a high concentration of carbon. These materials have usually been known as asphaltic materials. The greater part of this coloring matter is of a higher boiling range than the more desirable lubricating fractions and may be separated to a certain extent by a carefully conducted distillation. For this purpose the tendency is to resort to a vacuum distillation which makes it possible to vaporize the heavy lubricating stocks without excessive decomposition. However, especially with mixed base crudes, it is impossible to produce a distillate entirely free from these undesirable coloring compounds.

It has been found that these deleterious materials can be removed, to a large extent, by a sulphuric acid treatment. The reactions, of course, will be different for different conditions, for in some cases it is a problem of removing sulphur compounds while in others it is the removal of a purely hydrocarbon compound. No attempt will be made here to set up or explain in detail the reactions involved, but it is generally accepted that they are all typical chemical reactions. Therefore, to obtain optimum results we must carry out the process in such a way as to obtain an intimate mixing of the reagents and to have accurate control of the time and temperature of the reaction; also the concentration of the reagents. Any foreign material or reagents must also be excluded from the system. This makes the operation one of precision, but if any one of these fundamental points is overlooked we have lost control of the reaction and the results will be governed more or less by chance.

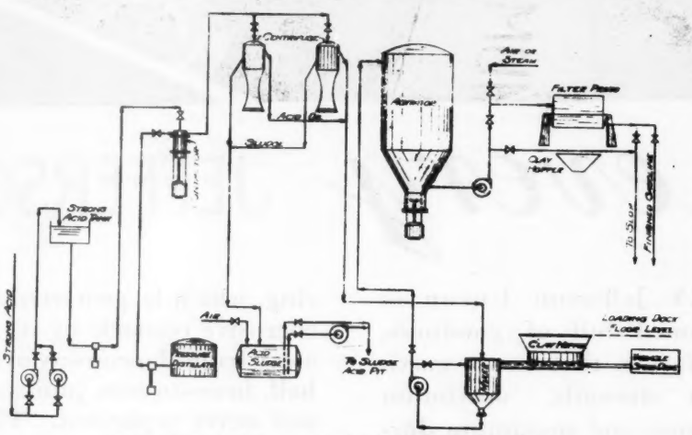
Past Methods

Little absolute control has been possible in our older types of treating work. Here we find poor agitation, practically no control of time and in many cases little flexibility of temperature. In much work, particularly with lubricating oils, air has been purposely added for agitation. This, of course, upset the real reaction by the added oxidation involved. All of these have led to the production of very inferior products, much wasted material and added expense due to rerun and similar operations.

It has been the aim in the conception and development of this newer process of treating to embody a means of accurate control of each step involved. This has required very careful consideration of the various problems in each operation. Figure 1 gives a diagrammatic picture of the process in a simpler form. Certain auxiliary pieces of equipment will necessarily be required for specific installations.

The first requirement for such a process is an accurate continuous proportioning of the raw material and the acid. The raw material may be handled by any of the customary methods of pumping and flow control. The acid, however, presents a more difficult problem. In smaller installations, especially when treating gasoline, the hourly acid consumption is very small. One of the most accurate types of proportioning device seems to be a positive plunger pump. The conventional blow case or a centrifugal pump with an orifice or valve arrangement may be used, but such a system is not highly satisfactory when handling corrosive materials. Therefore a proportioning pump is used as standard equipment for this service. Usually, a dual piston pump with variable stroke is used in order to give a uniform flow and a maximum of flexibility.

These predetermined proportions of raw materials and acid are discharged directly into the mechanical agitating



Flow chart showing removal of acid sludge by centrifuges.

equipment. This mechanism has been perfected to a very high degree, giving such intimate contact that at times the result is almost a colloidal suspension. The contactor used is entirely closed, excluding all air and other foreign matter. It is a high speed motor driven unit which brings about the contacting almost instantaneously. This gives a definite time of start for the recation; a thing difficult to accomplish in conventional equipment.

From here the reaction proceeds; the time being governed by the hourly throughput and the volumetric capacity of the equipment. When the desired time has elapsed the mixture is discharged into the separating centrifuges.

Function of Centrifuges

The efficiency of the centrifuge for making a separation between materials of different specific gravity has been demonstrated in many processes. A great amount of this has been in industries other than petroleum, but we are well aware of their success in dewaxing and dehydrating oils. They have likewise proven to be the same faithful servants in this newer role. Special consideration has been given to the mechanical and metallurgical conditions required for this work with the result of a very satisfactory piece of equipment.

The separation of the acid sludge is rapid and complete. All of the material which is produced by the acid reaction is thrown out at the desired moment, giving no opportunity for secondary reactions or resolution of the sludge material in the oil. Only the initial reaction is allowed to go to completion.

This sludge free oil is then brought into contact with the neutralizing agent. This may be any type of material that it is convenient to use, however, fine fullers earth seems to be the most desirable. In its use we reap the benefits of its decolorizing properties along with the neutralization. When earth is used, it is, of course, necessary to provide the system with a suitable filter for removal of the spent clay.

At any point or points in the system heaters or heat exchangers may be introduced to control the temperature of the oil stream. The time element is so planned as to allow for the treating of gasoline at atmospheric temperature, while lubricating stocks may be handled at any desired elevated temperature.

Precise Control

We see from this that we have a system which embodies a method of control of each of the variable factors of a chemical reaction. This is precisely the thing that we have desired to do. Here is a chemical reaction where the temperature of the reacting substances may be controlled at will. They are brought into intimate contact in a definite proportion at a fixed instant and the reaction allowed to proceed up to the desired point where it is stopped by an instantaneous and thorough separation of the oil and the products of the reaction. Not only are all of the variables accounted for, but their control is flexible and exact. Thus acid treating of petroleum has been made a science rather than a trade.

The acid stage oil, as it comes from the centrifugal is a material far different from that of conventional practice. It contains no trace of sludge, "pepper" nor free acid. Its acidity is only that of actual combination with the hydrocarbons. Hence, a minimum amount of neutralizing material is required.

By having accurate control of the reaction the quality of the sludge can be governed and no difficulty is encountered in its continuous removal.

The process can be used as a single stage treat with only one application of acid and subsequent removal of the sludge. But if it is desirable, as may be the case with high sulphur bearing gasolines and with lubricating stocks, the application of the acid may be incremental with intermediate sludge separations. This may involve the use of different acid strength at different points or the recirculation of sludge as a "water acid."

Results of Practice

In practice, this process has proved to be one of much value and merit. In every case the consumption of reagents, both acid and neutralizing material, have been much less than in any other treating process on the same material. The loss in acid sludge is less and the sludge produced is of smooth texture and easily handled. The process is continuous and entirely a closed system. The products are of superior quality, due to the possibility of doing a desired amount of treating without secondary reactions or over treating.

In the treating of pressure gasoline the need of rerunning is eliminated. On commercial plant operation a Jenkins 410° F. endpoint pressure gasoline of 16 color, Saybolt Universal, is being treated with 1 pound of 66° Be. sulphuric acid and 2 pounds of raw fuller's earth per barrel with a resulting color of plus 25. This material is not rerun and has satisfactory stability and gum content. In another instance a similar pressure gasoline of 17 color is being treated with approximately 0.8 pound of acid and 0.8 pound of clay per barrel with a resulting color of 25.

This makes it possible to operate a cracking plant to produce an endpoint product direct from the unit and treat this material to a premium product without the expensive rerunning operation. This is a thing that has long been the desire of every petroleum refiner. Toward this end much money has been spent in the installation and use of special equipment and towers, none of which have been entirely satisfactory. In rerunning we are confronted, not only with the actual cost of the operation, but also with the loss of time, the loss in still residues and the investment in added distillation equipment. In some cases it may require slightly more treating reagents than are usually used before a rerun operation, but in no case can we anticipate that this will be at all equal to the expense of the rerunning.

Any Grade May Be Processed

Any grade of lubricating stock can be treated without difficulty. Residual stocks ranging in viscosity up to 170 seconds at 210° F. have been treated; either as concentrated stock working at elevated temperatures or in solution at atmospheric temperatures. In either case a great saving of reagents has been experienced with a corresponding lowering of the sludge loss.

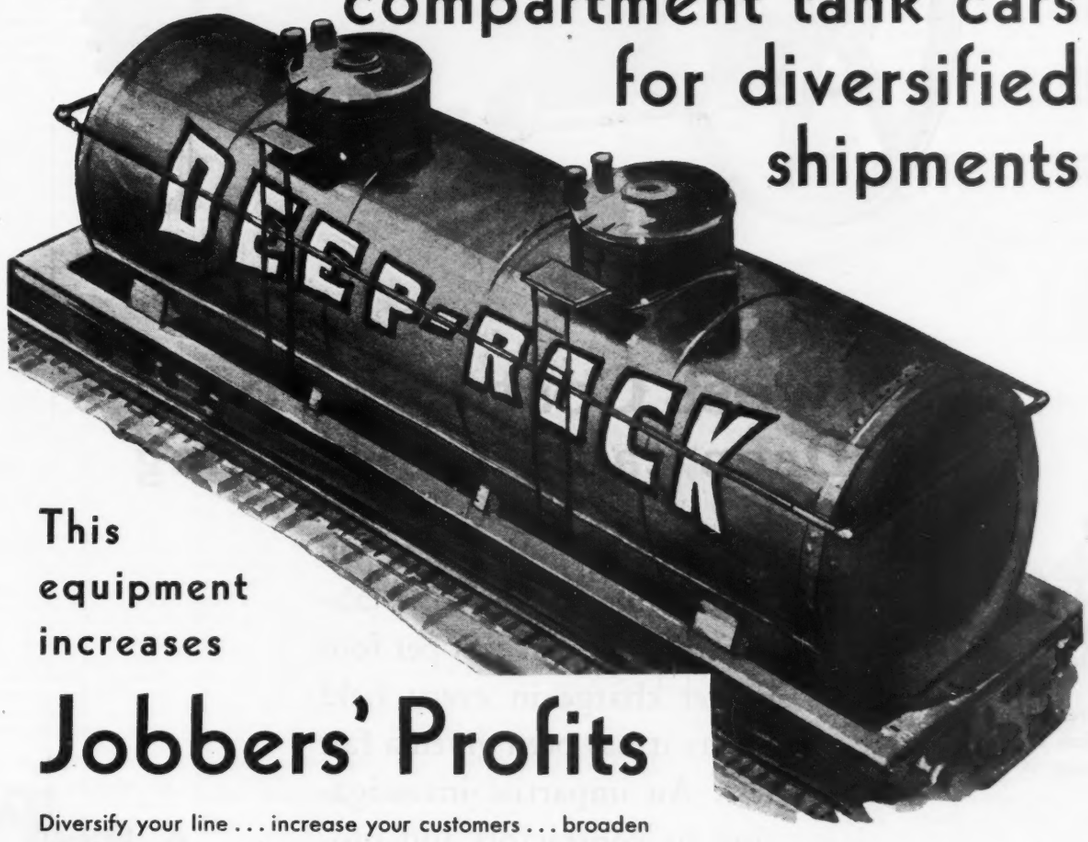
A dewaxed 150 viscosity at 210° F. vacuum refined stock from Mid-Continent crude can be treated with 20 to 25 pounds of acid per barrel and neutralized with 4 to 6 pounds of clay per barrel with a resulting color of 4 to 5 N.P.A. The sludge loss will be less than 12 per cent. In conventional practice, the loss will be much greater and the resulting color will be no better than a "D" or "E." Anyone familiar with this work will readily appreciate this extreme difference in resulting color.

GASOLINE SUPPLY

The domestic production of gasoline at refineries in 1929 totaled 434,241,000 bbls., an increase of 57,296,000 bbls. or 15.2 per cent over the total for 1928. The imports of gasoline in 1929 were 8,868,000 bbls., an increase of 4,670,000 bbls. or 111 per cent over the total for 1928.

At your service — — —

compartment tank cars for diversified shipments



This equipment increases

Jobbers' Profits

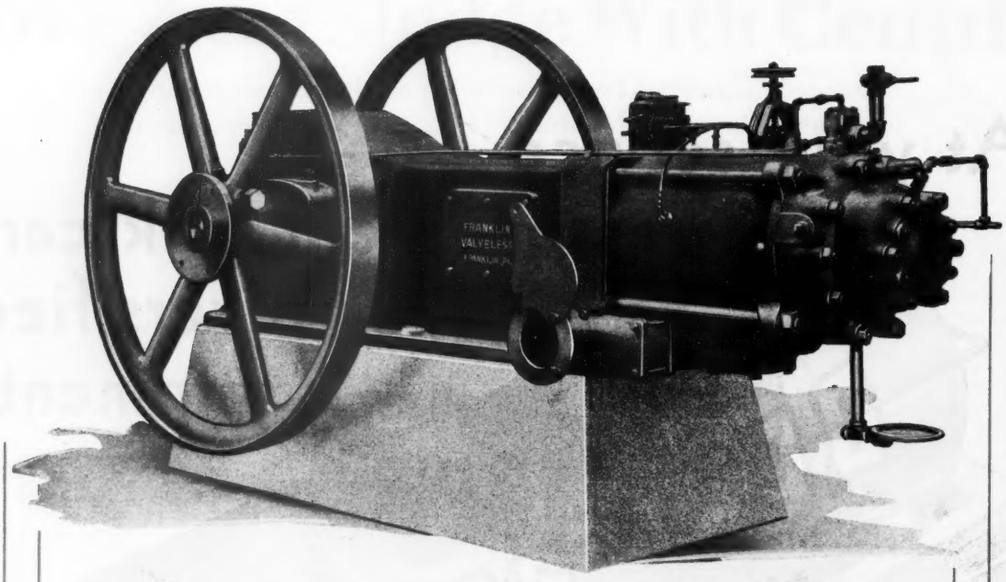
Diversify your line . . . increase your customers . . . broaden your business . . . make more money by handling a *variety* of Deep-Rock Petroleum Products. You can do this by speeding up your stock turnover and at the same time you can keep your investment down where it belongs. Order as much or as little as you need of two or three or more Deep-Rock Specialty Products, and Premium Gasolines and Kerosenes.

There are many concerns in your locality that buy one or more of the products listed here. There's business waiting for you . . . extra profits if you handle the diversified line of Deep-Rock Products.

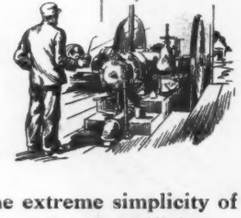
Write today for information regarding both the products and service for which the Deep-Rock Organization is famous.

KLEEN-ER NAPHTHA
V. M. & P. NAPHTHA
STODDARD SOLVENT
RUBBER SOLVENT
NAPOLEUM SPIRITS
MINERAL SEAL OIL
KEROSENE
AVIATION GASOLINE
KANT-NOCK-ETHYL GASOLINE

SHAFFER OIL and REFINING COMPANY
General Sales Offices: 300 West Adams Street, Chicago, Illinois
Refinery: Cushing, Okla.

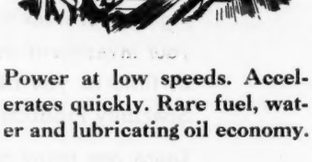


Lowest Cost Per Foot *for* Deep cable tool drilling

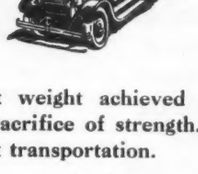


The extreme simplicity of the OF makes for efficiency and a minimum of supervision.

The Franklin Valveless OF Oil Drilling Engine has established the lowest cost per foot power charge in every field where it has been given a fair test. An impartial investigation by contractors and producers is invited—not only of the OF but of the OG, the Franklin Valveless Gas Pumping Engine.



Power at low speeds. Accelerates quickly. Rare fuel, water and lubricating oil economy.



Light weight achieved without sacrifice of strength. One truck transportation.

FRANKLIN
VALVELESS ENGINE CO.
FRANKLIN, PENNSYLVANIA

Distributed by

OIL WELL SUPPLY CO.

Fuels and Lubricants for Aircraft

Classification and Properties of Gasoline and Lubricating Oils for Use in Aviation. Effect of Engine Design

By Dr. C. K. Francis*

The fuel and lubricants used in aircraft motors are both derived from petroleum, and because of the varying composition of the petroleums of the world and different refining methods, it is natural these products should have different values according to their source and methods of manufacture.

Petroleum is not a simple substance but is a complicated mixture of numerous hydrocarbons. In addition to the hydrocarbons, composed of hydrogen and carbon, small quantities of sulphur compounds, nitrogen, and gum-forming bodies are present. Petroleum occurs in the earth in geological structures of various sorts. These structures are usually sandstones and porous limestones. Just how petroleum was formed in the earth and was deposited in these structures, nobody knows, but many investigators tell us that petroleum is probably of organic origin. That is, it may have been formed from both animal and vegetable matter; then after being produced from these substances, has been forced into the porous formation by water pressure and, in a few instances, by gravity.

While petroleum has been known from very early times, being found upon the surface of water and occasionally issuing in the form of a spring called a seepage, it was not of commercial importance until 1859, that is only 70 years ago, when the first well was drilled by Colonel Drake near Titusville, Pa. This means of bringing oil to the surface has opened up vast deposits of a product which has meant much to the advancement of civilization. It was soon learned that petroleum contained an oil which was suitable for burning in lamps, and for many years kerosene continued to be the most valuable product obtained from petroleum.

Refining Methods

The methods which are used by the refiner for making the products are based on some form of distillation, that is by changing the oil or a part of it into vapor, then cooling it to a liquid.

Petroleum is a complex mixture and, unlike simple substances such as water, which boils at a constant temperature, is found to boil according to the nature of the substances contained in it. When water is heated under normal conditions, it will boil when the temperature reaches 212° F., and no matter how much heat may be placed under a vessel containing water, it will not be possible to get anything other than steam from it. When the steam is conducted through a coil placed in a cooling medium, it will return to the liquid condition again; it will be the same as the original substance, water.

When petroleum is heated under similar conditions it will begin to boil at some temperature, let us say 100° F., and if held at the temperature at 100° F. for a sufficient length of time, it will cease to boil. When the oil is boiling, the vapors may be conducted through a pipe into a cooling medium and become condensed to a liquid. This liquid will be unlike the petroleum which was heated. Now if the temperature of the oil is raised to some higher degree, say 150° F., it will again boil, and some more liquid may be condensed. This will be unlike the first portion; and if the temperature is held at 150° F. for a sufficient length of time, there will come a stage when no more will come off, that is boiling will stop. Then if the temperature is raised still higher and held at that point, another fraction may be separated which will be unlike the other two. Such fractions, known in the petroleum industry as cuts, represent the principles upon which the refiner separates the raw products. These cuts or fractions are blended and combined in numerous ways to make each of the commercial products. The primary substances obtained from petroleum in the order in which they are separated from the crude oil are known as gasoline, naphtha, kerosene, gas oil, lubricating oil, fuel oil, and after everything has been removed there may be a solid residue called petroleum coke.

Motor Fuel

When petroleum was first refined, principally for its kerosene content, it was necessary to eliminate the first fractions because they were easily changed upon heating into gas and vapors which, when mixed with air, would cause explosions. There was no great use for this material, but its combustible characteristics attracted the attention of inventors, with the result that a very powerful engine was designed to operate with this type of fuel. It is doubtful whether any other material would have been found so satisfactory as modern gasoline for use in the automobile engine. There are other motor fuels which have received some attention. The most promising looking of these are the light liquids that are obtained in the distillation of coal, shale, wood, and various vegetable materials. Several of the alcohols may be used as motor fuel. Benzol obtained from coal is used to a considerable extent as a constituent of some motor fuels.

Classifying Gasoline

The first means for classifying gasoline was based on its density, that is the gravity, and as the system which is used in the petroleum industry utilizes higher figures to denote the density of the lighter liquids than for the heavier ones, certain gasolines were known as high-test gasolines, and this term has remained with the industry to this day. We now appreciate that gravity alone is of little value, and that a high-test gasoline may be a poor product to use in an internal combustion motor.

Gravity, or weight, of the fuel to be used in an automobile is of little importance, but the weight of aircraft gasoline has considerable bearing upon power development and the cruising radius. The higher the gravity, the lower the weight per gallon but the heating value is greater per pound. For a given gallonage the lighter of two gasolines will produce more B.t.u. on a weight basis.

The quality of gasoline is determined by the results of several physical and chemical tests. Color and odor may be noted, but these are of minor importance. The percentage of sulphur must be very low, and in most aircraft gasolines it is below .05 of 1 per cent, because of its corrosive properties through the formation of sulphides and acids. The most important test today is the distillation test for determining volatility.

Volatile Properties

The volatile properties of a gasoline are determined by distilling 100 cubic centimeters of the material in standardized apparatus under precise conditions. These properties are usually indicated by means of the initial boiling point; that is when the gasoline begins to form a vapor which will condense. The initial boiling point is that temperature at which the first drop falls from the end of the condenser tube. Then the temperature is noted as the fractions collect. The initial boiling point and the 5 and 10 per cent temperatures are measures of the adaptability of the gasoline for easy starting of the engine. The higher percentages indicate the relative quantity of heavy hydrocarbons. These are especially important for a product that is to be used in automobiles because the products distilling at higher temperatures are not easily volatilized, and consequently leak into the crankcase and there dilute the lubricating oil. Dilution is not common in aircraft engines but the higher percentages of the distillation test, together with the end-point influence performance and the formation of objectionable deposits.

Aircraft Gasoline

The quality of the aircraft gasoline is based on the specifications of the Federal Government, and these are outlined in the table below:

United States Specifications for Aviation Gasoline

	Grades	
	Domestic	Fighting
Doctor	Negative	Negative
Color	Saybolt 25	Saybolt 25
Corrosion	Negative	Negative
Acidity of residue	None	None
Sulphur, not above	0.10%	0.10%
Gum, not above	3 mgs.	3 mgs.
Distillation Range		
5%	122/167	122/149
50%	221	203
90%	311	257
96%	347	302
Endpoint	374	329
Recovery	96%	96%
Loss	2%	2%

The volatility of these two grades is indicated on the chart by the two curves that begin at the 5 per cent point. The upper one representing domestic and the lower fighting grade. The other curves were made from the distillation data of several aviation gasolines now available.

Fighting Grade Gasoline

A fighting grade gasoline made from natural gas contains the several hydrocarbons shown in the following table:

Hydrocarbon—	Per cent
Iso-butane	Trace
Butane	3.8%
Pentanes	17.4%
Hexanes	32.8%
Heavier	46.0%

The distillation analysis of this gasoline is:

	Temp. °F.
A.P.I. gravity	67.3
I.B.P.	95
5%	123
10%	132
20%	145
30%	155
40%	164
50%	177
60%	188
70%	202
80%	218
90%	244
98.8%	320 max.
Residue	0.8%
Loss	0.4%

Antiknock Property

Recently a new property of gasoline has been noted, and that is its chemical composition which may be such as to cause excessive knocking of the motor and consequently, methods have been developed for measuring this tendency, and the results are commonly known as antiknock or simply knock-rating.

The detonating character of gasoline is now considered to be most important. In the early days of the motor industry it was thought that gasoline was gasoline, and no attention was paid to its chemical composition, but it was soon discovered that gasoline made from certain crude oils gave a much better performance than gasoline made from another type of crude. The knocking of the motor was found to be more when the compression ratio of the engine was increased in order to obtain greater power. The knocking in the cylinders causes the development of high temperatures, and produces preignition of the gasoline. Another way of saying this is that the fuel ignites before the designated time for it to ignite. This condition results in increased wear and tear on the engine with the consequent loss of power.

The aircraft industry is especially interested in obtaining a fuel which will not cause the engine to knock. There are three ways of controlling the knocking quality. The crude oil may be selected, and oils of particular value for this purpose are found to a large extent in California. The process of manufacture may be designed to conserve and concentrate the hydrocarbons which are of antiknock value. This is being done in the Mid-Continent district. The other method is to add some chemical to the gasoline.

Knock Inhibitors

It has been found that certain chemical substances when added to gasoline will influence the knocking tendency. Midgley and Boyd have listed some of the more important knock inhibitors.

	Relative effectiveness (volume)
Aniline	11.45
Benzene	1.0
Toluene	1.093
Xylene	1.20
Alcohol	1.85
Ethyl iodine	13.87
Xylidine	12.03
Toluidine	11.86
Tetraethyl tin	20.4
Diethyl selenide	62.5
Diethyl telluride	250.0
Iron carbonyl	250.0
Nickel carbonyl	277.0
Tetraethyl lead	528.0

The chief difficulty met with during the preliminary experiments was the burning of the tetraethyl lead to lead oxide (litharge) in the engine, some of which accumulated on the plugs and valves, causing the plugs to short very quickly and the valves to stick.

Finally, it was discovered that it was possible to overcome this trouble by the addition of a halogen bearer, which had the effect of combining with the litharge during combustion and forming a volatile compound, which was thus ejected through the exhaust ports.

The concentrated ethyl fluid is now made in one mixture consisting of 54.5 per cent tetraethyl lead, 36.4 per cent ethylene dibromide, and 9 per cent halowax oil. The specific gravity is 1.79 at 20° C. It is entirely soluble in gasoline.

Compression Ratio

The compression ratio on the internal-combustion engine is a valuable indication of the power which may be developed by the pressure of an explosive mixture of gasoline vapors and air within the cylinders of the engine. It has a direct relationship to what may be accomplished with respect to speed and endurance. High compression ratios are desired and are limited only by the strength of materials and the character of the fuel. The statement of compression ratio of the engine involves the determination of the capacity of the cylinder under two conditions. These are the volume drawn into the cylinder at each upstroke, and the volume at the end of the stroke under normal conditions. If the volume of free space in the cylinder when the piston is at the end of the downstroke is 40 cubic inches and is 10 cubic inches when at the end of the upstroke, the ratio is plainly 1:4.

Knock Rating

The Navy Department Bureau of Aeronautics has recently announced that beginning with the spring of 1930 the bureau desires to use domestic aviation gasoline on both west and east coasts capable of continuous operation in a single test engine with a 5.1:1 compression ratio. The meaning of this introduces another basis for stating the knock rating of a gasoline. The knock rating is determined by means of a one-

*Before Aeronautical Division of Society of Automotive Engineers, Wichita, Kans., January 16, 1930.

cylinder engine equipped with a head which will permit a change of the compression ratio while the fuel is being tested. The highest useful compression ratio is the one which will enable the engine to operate continuously without destructive detonation. The air-cooled engines commonly used in United States have a compression ratio of 5.25:1, and the water-cooled engines approximately 5.5:1.

The color and odor of gasoline are of little importance. The presence of water, the quantity of sulphur, and the stability are of considerable importance. Aviation gasoline must, of course, be absolutely free from even the slightest trace of water. High sulphur fuel means corrosion of the motor parts. Stability is a term which has been introduced in reference to the gum content of gasoline, and for aviation purposes the United States Government requires that the fuel should not contain more than three milligrams when tested under prescribed conditions.

Gum Content

There are two ways of expressing the gum content of gasoline. These are actual and potential gum. It has been found that some gasolines may have a low gum content when first prepared, this is actual gum, but after remaining in storage for some time the quantity increases to a considerable extent, and this is called potential gum. Unfortunately the conditions in a refinery which produce a gasoline of high knock rating are liable to produce at the same time those hydrocarbons which tend to form gum. It is the problem of the modern refiner to conserve nondetonating substances and eliminate the substances of a gum-forming character. This is largely a matter of heat treatment and purification with sulphuric acid and other suitable chemicals.

Almost twice as much gasoline is required to operate an automobile at a speed of 60 miles an hour as when driven at the rate of 30 miles an hour, the larger quantity being required to overcome wind resistance. This is an important factor which influences operation and design of aircraft.

Charles F. Kettering, president of the General Motors Research Corp., foresees the time when 80 miles will be traveled on 1 gallon of gasoline. But the car, to obtain that results, will have to be very light and the motor very small, operating at the highest possible compression and the highest speed. Such a car is not yet in demand.

Airplane Consumption

Airplanes, with single motors, consume gasoline at the rate of 1 gallon to each 10 miles flown or approximately 60 pounds per hour for a motor developing 140 horsepower at maximum speed. This is equivalent to 0.5 pound per horsepower hour. The largest trimotored ships with a capacity of 16 persons, traveling at the rate of 100 miles per hour, consume about 1 gallon per minute.

Efficiency Tests

The United States Bureau of Standards has recently announced results of a series of efficiency tests with different types of engines and gasoline of varying quality. The bureau has stated that different people—even automotive engineers—rarely agree as to the relative merits of a given set of gasolines. This disagreement is in fact often so pronounced as to raise the question: Is it because the engines of their cars also disagree as to which fuel is best? If so, the fuel must be adapted to the engine; if not, an all-around "best fuel" can be produced.

In connection with a program for conservation of petroleum resources, the Bureau of Standards recently studied this question. Specifically, this work was confined to a study of the relative merit of a series of common fuels for giving acceleration. In all, nine engines, representing the most modern automotive design, were used. Careful tests were made of the behavior of the same set of fuels in each of these engines.

These results show that each engine "rated" the fuels in exactly the same order at all temperature conditions used. Differences in design, however, caused the actual valve of the improvement of one fuel over another to differ among the engines tested. For an extreme example, under summer operating conditions, one engine found a certain fuel to be 6 per cent better than the reference fuel; another engine rated it as being 25 per cent better.

It appears, therefore, that while it is possible to produce one fuel which will be best for all engines, the engine design may also be modified in some cases to take fullest advantage of this improvement.

Lubricating Oils

The lubricating oils are obtained from what is known as the wax distillate or lubricating oil distillate from the crude oil. The distillate is cooled for the purpose of solidifying the wax which is extracted either by means of presses or centrifugal machines. The conventional practice is to separate the lubricating oil and wax by means of presses which operate under low temperatures and high pressures. The wax-free oil, known as "pressed distillate" is concentrated and purified to the desired quality. The important characteristics of lubricating oil are viscosity, pour test, and carbon residue. There are other physical and chemical characteristics which must be considered, and I shall speak of them in another paragraph.

During the course of the development of the internal combustion engine for the automobile, problems have been encountered which have resulted from faulty lubrication and the poor quality of the lubricants. The same problem has been encountered in many aircraft power plants and the short life of many of the first airplanes was no doubt due to poor mechanical conditions for handling the lubricating oil, and the use of a poor quality oil. The expression "quality has no substitute" is more than a happy phrase. It is a safeguard against poor lubrication and even disastrous results. Varying surfaces and assemblies, which, when properly lubricated, will give long service, may be ruined by a few hours of neglect. A high-quality aircraft oil is a product which depends upon the crude oil, special refining, and safe packing. Careless handling of a fine oil may permit serious contamination. Airplane oil must be of the highest quality. It must be an oil that is free flowing, yet one that maintains its body under high pressure, high temperature, and changes in atmospheric conditions.

Classifying Lubricants

The Society of Automotive Engineers has classified lubricating oils by numbers, known as S.A.E. numbers. The table indicates how these numbers correspond with viscosities.

S.A.E. visc. No.	At 100° F.	Viscosity range at 130° F.	At 210° F.
10	135-200	90-115	
20	220-330	120-150	
30	410-500	185-220	
40	600-630	255-	-70
50	635-1,000		75-95
60	1,300-1,800		105-120

It is important that some system of classification be recognized when purchasing aircraft oils regardless of who may manufacture them. The S.A.E. numbers offer a convenient system for this purpose, and is one which will permit the pilots to have a knowledge concerning the grade of oil that is purchased.

Viscosity

There is a tendency on the part of aircraft engine manufacturers to demand an oil of higher viscosity than S.A.E. No. 60, the limit of which is 120 seconds viscosity at 210° F. The refiner is meeting this requirement with an oil having a viscosity of 140 seconds at 210° F. The heavies grades of lubricating oil are especially desirable in the sections of the country where there is a long summer season, and everywhere for what is known as "hot weather" flying.

The formation of carbon from the lubricating oil must be kept at a minimum and for high grade oils the carbon residue is usually very close to 1 per cent. A much larger quantity than this indicates imperfect refining and a poor quality oil. The ideal lubricating oil would form a protective coating strong enough to maintain an unbroken film between bearing surfaces and which would evaporate, under working conditions, without evolving corrosive gases or depositing a residue. A lubricating oil meeting such requirements is unknown. The selection of crude oils which are known to contain fractions having desirable qualities and the improvement of refining processes have contributed in making the modern high grade lubricating oil a product of exceptional purity, but volatility and stability cannot be obtained in an oil which must withstand the severe conditions of the internal combustion motor. One end of the cylinder is comparatively cool with the other quite hot, so an oil traveling along the cylinder walls must reach a heated zone where rapid evaporation and even decomposition takes place causing the formation. and accumulation of residues known as carbon deposits. It has been found that the low volatility lubricating oils deposit more carbon, under ordinary conditions, than those showing a high volatility.

Flash and Fire

Additional important properties of lubricating oils are the flash and firepoints. The flashpoint is the temperature at which the oil when heated will give off combustible vapors or gases. A low flash indicates the presence of light oils, and an extremely low flash indicates contamination with kerosene or gasoline. A comparatively high flashpoint suggests that the oil is not a blend with the low boiling point or thin-bodied oils. The firepoint is the temperature at which vapors are given off from the heated oil which will when ignited continue to burn. The flashpoint required for the United States Government Liberty Aerial oil varies between 400 and 450°, and the firepoint is approximately 40 to 60° higher.

The presence of sulphur both in the fuel and in the lubricant frequently explains serious operating conditions. It is not economically possible to produce a gasoline or lubricating oil entirely free from sulphur. This substance will combine under favorable conditions with oxygen from the air and small quantities of moisture to produce acid compounds, largely sulphuric acid. Many serious instances of corrosion have been traced to sulphur. It is therefore desirable to use a gasoline and lubricating oil with the minimum percentage of sulphur. The United States Government permits the purchase of gasoline having as much as one-tenth of 1 per cent total sulphur; however, the majority of the gasolines on the market at this time contain considerably less than this quantity. The sulphur in lubrication oil is not so liable to cause corrosion as sulphur in the fuel. The reason for this is that in order for acids to be produced from the sulphur, the oil must be burned so that the sulphur oxides will be formed.

1930 LUBRICATING CHART—AIRPLANE OILS

Make—	Model	Type	Tropical	Summer	Winter	Frigid
Allison	V-1410 V1650	V-AC	140	120	100	80
American Cirus Mark	111	1-AC	120	100	80	80
Armstrong Seddly	Leopard	R-AC	140	140	120	100
Armstrong Seddly	Jaguar	R-AC	140	140	120	100
Armstrong Seddly	Lynx	R-AC	120	120	100	80
Armstrong Seddly	Mongoose	R-AC	120	120	100	80
Axelson	B	R-AC	120	120	100	80
Bates Junior		R-AC	120	120	100	80
Bliss	Neptune	R-AC	140	120	100	80
Bliss	Titan	R-AC	120	120	100	80
Bliss	Jupiter	R-AC	140	120	100	100
Brownbach	C-400	R-AC	120	120	100	80
Century		L-AC	120	120	100	80
Chevrolair	C-6 D-4	L-AC	120	120	100	80
Comet	D & D-7	R-AC	120	120	100	80
Continental	A-70	R-AC	120	120	100	80
Curtiss	Conqueror	V-WC	140	140	120	100
Curtiss	D-12 C-6	V-WC	140	120	100	80
Curtiss	Challenger	R-AC	120	120	100	80
Curtiss	OX & OXX 6	V-WC	120	120	100	80
Dayton Bear		L-AC	120	120	100	80
Fairchild Genet		R-AC	120	120	100	80
General	AP-5	R-AC	120	120	100	80
Harris	B-1	V-WC	120	120	100	80
Heath		L-AC	120	120	100	80
Hess Warrior		R-AC	120	120	100	80
Hispano-Suiza		V-WC	120	120	100	80
Hurricane	C-450	R-AC	120	120	100	80
Irwin	79	R-AC	120	120	100	80
Kimball	K	R-AC	120	120	100	80
Kinner	K-5	R-AC	120	120	100	100
Le Blond		R-AC	120	120	100	80
Lee	C-5	R-AC	120	120	100	80
Liberty		V-WC	140	120	100	100
Lycoming	R-500	R-AC	120	120	100	80
Mac Clatchie Panther		R-AC	120	120	100	80
Menasco		R-AC	120	120	100	80
Michigan Rover		L-A	120	120	100	80
Murray	Ajax	R-AC	120	120	100	80
Murray	Atlas	R-AC	120	120	100	80
Packard	3-A-2500	V-WC	140	120	120	100
Packard	3-A-1500	V-WC	140	120	120	100
Packard	1-A-2775	X-WC	140	140	120	100
Salmson		R-AC	120	120	100	80
Seimens-Halske	All models	R-AC	120	120	100	80
Szekely	SR-3-5	R-AC	120	120	100	80
Walters	All models	R-AC	120	120	100	80
Warner	Scarab	R-AC	120	120	100	80
Wasp	All models	R-AC	140	140	120	100
Wasp Junior		R-AC	140	140	120	100
Western	L-7-1	R-AC	120	120	100	80
Wright	Cyclone	R-AC	140	140	120	100
Wright	Gypsy	L-AC	120	120	100	80
Wright	Typhoon	V-WC	140	140	120	100
Wright	Whirlwind	R-AC	140	120	100	80
Velie	M-5	R-AC	120	120	100	80

DISCUSSING EXPORTS

NEW YORK, Mar. 3.—Representatives of 17 oil companies visited Dr. John Frey, chief of the petroleum section of the Department of Commerce, at the department's New York office, for informal discussion of various phases affecting export activities.

Among the questions brought up for discussion were those dealing with shipping facilities to South Africa, Madagascar and the Far East, method of making sales and deliveries to the Spanish Petroleum Monopoly, and general conditions in all foreign markets.

Dr. Frey addressed a number of executives of The Texas Company at a noon luncheon at the company's offices here. The conferences held by Dr. Frey are in line with the policy recently adopted by the Bureau of Foreign and Domestic Commerce to have commodity division chiefs visit the New York office to enable them to meet in a more intimate way representatives of companies in the industries which they cover. Dr. Frey will be in New York again this month, and it is planned to make the series of conferences a regular monthly affair.

The meetings were held in the office of Richard P. Hendren, New York commercial agent, in the Custom House.

R. W. WALLACE DIES

Robert W. Wallace, 63, long connected with the oil industry, died at Mineral Wells, Tex., February 24. Mr. Wallace entered the oil industry a number of years ago in Parkersburg, W. Va., and went to Texas during the Ranger boom. His wife and daughter survive.

Technical Questions Answered

BY CHARLES K. FRANCIS, PH.D., TECHNICAL EDITOR

This department of The Oil and Gas Journal is devoted to the manufacturing branches of the oil industry.

Those connected with the refining of crude petroleum, the manufacture of natural gasoline and closely allied industries are invited to submit their problems to Dr. C. K. Francis, technical editor. The department was created for the purpose of aiding managers, superintendents, engineers, chemists and all those engaged in the various phases of plant operation; also those connected with the marketing and utilization of petroleum products.

Questions should be submitted in as much detail as possible so as to assure a satisfactory answer.

All inquiries should be signed and if other than the given initials are to be used please indicate the desired letters.

Questions involving patented processes, intricate formulas and calculations and estimates of costs, for obvious reasons, cannot be answered. The replies will appear on this page within a reasonable time.

BURNERS FOR FUEL OIL

The fuel oil we are burning under our boilers causes a deposit of coke or carbon to form around the oil outlet of the burner and does not give a good flame. Could you furnish a set of specifications which could be used to purchase a better oil? The fuel we get has a gravity between 18 and 20 with under 1 per cent sediment.—D. N. L.

More details about the burner would probably indicate that it is the source of the trouble and not the fuel oil. The construction of the burner, the kind of material and the position of the oil outlet with respect to the steam or air outlet are important factors. Formerly there were a great many burners in use which were of local manufacture but it is now recognized as a fact that an oil burner is an instrument which must be constructed on scientific principles, so the better efficiency of the burner made by reputable manufacturers is quite generally appreciated over the home-made affair.

Frequently the furnace is not designed for burning fuel oil; that is, it may not be large enough, it may not be of the proper shape, and even the materials used in the construction may not be suitable.

The chief requirements of an oil burner may be briefly mentioned as follows: There must be adequate atomization of the oil and there should be considerable flexibility in this respect so that it will operate with oils of different gravity. The flame must not be localized, but must be long and broad and fit the furnace. There must be thorough mixing of the atomized oil with enough air to maintain combustion at the practical limit. The composition of the burner tip should be such that there will be no affinity between the metal and carbon of the oil, otherwise there will be the tendency to carbonize the metal and the dangerous accumulation of a deposit. Most industrial burners are of the outside mixing type with the steam outlet arranged so that the steam will be directed across the oil outlet and aid in keeping it clean.

The specifications indicated for the fuel oil should prove satisfactory for the purchase of a good grade of oil. It may be wise to provide that the oil will flow freely through a 1-inch pipe at 60° F., and that the cars be equipped with steam coils to facilitate unloading. A complicated set of specifications cannot help much for ordinary use and when required may frequently entitle the seller to a premium over the market price.

FILING SYSTEM REFINERY SUBJECTS

I am developing a personal filing system and would like to have your assistance in obtaining a convenient, logical and compact system covering all the subjects usually encountered in a modern oil refinery. The main groups proposed are: General, chemical, mechanical, electrical, construction, petroleum, refinery and gas. As all of these subjects are covered regularly in your publication and must be indexed you can undoubtedly give me some practical information. —W. B. K.

The index of The Oil and Gas Journal, published twice a year, may be of some assistance to you, although probably you will want to select a key which will separate the subjects in more detail.

The subjects, General and Refinery, are not definite, consequently a paper filed under such a heading may be difficult to find. Frequently it is advisable to change the title of an article so that it will conform to a selected system and local conditions together with personal preference may require a modification of any scheme.

The expansion of the subjects from the outline you have suggested to the following may improve the finding value of your file: Management, Distillation, Cracking, Chemical, Treating, Mechanical, Electrical, Construction, Power, Water, Fuel, Equipment, Inspection, Safety, Fire Protection, Petroleum, Storage, Products, Shipping, Gas.

An examination of the catalog systems that are in use in the libraries will no doubt suggest headings and subheadings. Any system though must not go into too much detail if confusion is to be avoided. There will always be a need to make exceptions to the file subject by the substitution of another one; such as corrosion in place of chemical or equipment, and possibly antiknock instead of inspection.

TREATING TEMPERATURE FOR HIGH SULPHUR DISTILLATES

What is considered to be the better practice when treating light oil distillates containing high percentages of sulphur, to apply the acid at high temperatures or low temperatures? The main object being to reduce the sulphur without high loss of antiknock products. If high temperatures were used, it is understood recovery of light vapors would be necessary.—F. R. G.

In a general way the increase of about 18° F. doubles the speed of chemical reaction and usually in addition to the shortened time there is a saving of the chemicals. However, when treating light oil distillates, and especially the cracked distillates, there is difficulty always in confining the action of the sulphuric acid to the sulphur compounds. Extensive chemical changes are liable to extend to other substances and result in losses which include both quality and volume, and this is especially true with respect to the unsaturated and aromatic hydrocarbons of antiknock value. The properties of petroleum products seem to suggest that low temperatures may give better results than if the treating were done under somewhat elevated temperatures.

There has been some discussion as the necessity for the refiner to remove sulphur from gasoline to meet the specification of 0.1 per cent total sulphur required by Government specifications, but we have no definite evidence that a higher quantity would not damage the motor and there appears to be little probability that the permissible quantity will be increased.

An article, "Method of Refining Cracked Naphtha," by R. A. Holloran, in The Oil and Gas Journal, December 8, 1927, Page 36, contains comments and details about the treating of distillates at low temperature, from which the following has been abstracted:

"Realizing that the rate of polymerization of unsaturated hydrocarbons is accelerated by increase in temperature, some experimental treatments were carried out at low temperature with most gratifying results. The desired reduction in sulphur was obtained with a marked reduction in treating and polymerization losses. Strong sulphuric acid at low temperatures proved to be an excellent solvent for sulphur compounds of the type occurring in cracked naphtha." On the basis of these experiments a commercial unit was constructed.

The product is given a preliminary treatment including application of a caustic solution and enough acid to remove all traces of water. The distillate is then cooled in several stages, the lowest temperature being minus 5° F., and the acid added in two or more stages to secure better temperature control. Each application of acid is followed by another cooling of naphtha and sludge in a reaction cooler, and the mixture then passes to sludge settlers, to water washers and finally to the caustic treaters. The water washing and neutralization steps take place at ordinary temperatures.

The author states that it is possible by this process to produce cracked gasolines of excellent quality. The high antidetonating compounds are retained, yields are increased, and treating costs are reduced to an extent which permits the refining of even the more refractory distillates, which cannot be treated profitably by other methods.

GAS FROM CRACKING STILLS

When cracking oil in a pressure still is the volume of gas produced greater from the oils that boil at a low temperature than from the oils having a high boiling point? How much gas per barrel of oil cracked is considered a good average yield? Can you furnish a representative analysis of this kind of gas? —T. H. A.

An extended analysis of the cracking process has been made by Dr. G. Egloff, "Development of the Cracking Process," published in The Oil and Gas Journal, October 18, 1928, Page 255. The data following are obtained from this article.

We must assume that the higher boiling oils are represented by the low gravity oils, while the high gravity stocks boil at comparatively lower temperatures. While the oils formerly charged to pressure stills were largely of the gas oil quality with high gravities and low boiling points, improved apparatus and a more exact knowledge concerning the application of heat have enabled the refiner to crack oils which are very heavy. Doctor Egloff describes some oils which are heavier than water.

There are 21 samples mentioned in Tables 4 and 5 indicating that the gravities of the oils charged to the cracking still varied from 9.7 to 38.4 A. P. I.; the operating pressures were between 105 and 135 pounds; liquid temperatures from 802° F. to 871° F.; gas yield per barrel charged 52 to 348 cubic feet per barrel. The largest volume of gas was from a crude of 18.2 A. P. I., and a gas oil 35.6 A. P. I. gravity. It appears from this information that definite conclusion regarding the gas volume and boiling point of the oil is impossible. Sometimes estimates are made on the basis of 150 cubic feet of gas per barrel of charging oil, but of course this will vary with operating conditions.

The composition of the gas from a Mid-Continent gas oil, 35.6 A.P.I. gravity, is reported:

Specific gravity	0.894
B.t.u. per cubic foot	1,123
Hydrogen sulphide and carbon dioxide	0.5%
Olefines	12.8%
Oxygen	0.2%
Carbon monoxide	0.1%
Hydrogen	3.9%
Paraffin hydrocarbons and nitrogen	82.5%

Typical analyses, emphasizing the unsaturated hydrocarbon content of the cracked gases, are shown in the following tabulation:

COMPOSITION OF CRACKED GASES

	%	%	%	%
Hydrogen	1.9	5.6	3.0	1.7
Ethylene	1.9	4.7	2.7	8.3
Propylene	0.8	6.1	7.6	12.0
Butylenes	7.4	2.0	6.5	7.1
Paraffins	88.0	81.6	80.2	72.9

ABSORBING CARBON MONOXIDE

Would it be possible to attach a filter or absorber to the exhaust from an automobile which would contain an absorbing chemical for carbon monoxide? —R. S. C.

Some effort has been made to construct an absorber which is suitable for neutralizing the carbon monoxide present in the automobile exhaust but the difficulty with this idea is that the volume of gas to be treated is so large and the chemicals that unite with carbon monoxide are too expensive. The quantity required would probably be so large that an absorber, such as that used in the gas mask, could be effective for short periods only.

If it were possible to perfect the combustion conditions so that no carbon monoxide would be formed, the dangerous condition would be corrected, but our present state of knowledge and mechanical skill does not indicate any great promise in this direction.

A recent announcement from John Hopkins University states that Professor Frazer has discovered a means for converting carbon monoxide in the combustion gases to carbon dioxide, which is entirely free from the dangerous properties of carbon monoxide, and that this scheme may be adaptable to conditions in the automotive industry.

Henderson and Haggard in Noxious Gases, Page 105, give the following about the quantity of carbon monoxide in the automobile exhaust gases:

"The exhaust gas from internal combustion engines contain carbon monoxide in percentages ranging from a fraction of 1 per cent to 7 per cent or even higher. The variation depends upon the proportion of air and gasoline in the mixture burned; the carbon monoxide increases with increase in the proportion of gasoline, that is with a rich mixture. A rough estimate of the volume of carbon monoxide that an automobile may produce is one cubic foot per minute per 20 horsepower. This is sufficient to render the atmosphere of a single-car garage deadly within five minutes if the engine is run while the garage doors are closed. In the streets where traffic is congested the content of carbon monoxide rises to about 100 parts per million of air, enough to cause slight headache after long exposure."

Continuous Operation in Cracking

High Degree of Safety Now Possible With High Pressure Equipment When Properly Installed and Operated

By S. V. Williams
A. O. Smith Corp.

The economic conditions that influence industry are always changing. Today, one method of manufacturing a given commodity meets with the economic pressure, tomorrow we must change our method and develop another—the methods of procedure changing, giving us a superior finished product at a rate of production accelerated and magnified to meet the created demand. Hence, any method that is highly flexible will function the longest before becoming obsolete.

The oil industry in manufacturing cracked gasoline or motor fuel, is today using temperatures and pressures which yesterday were not deemed expedient or possible. The application of temperatures and pressures make it possible to break down in a very short time what nature has taken years to put together. Yes, it is even possible to put together under temperature and pressure what nature has failed to combine. This is going nature one better. Naturally, the problems encountered are many and difficult and require improved technique in the making, shaping, fabricating, and treatment of the equipment suitable for the application of these higher temperatures and pressures.

Here in the United States, where the laws of economics have produced large corporations, competition is extremely keen and the quality of any industrial product if it is to survive must be of the highest degree. Its performance under operating conditions must approach perfection. Hence, each manufacturer must know all about his products and ever strive to perfect them.

Study of Pressure Vessels

Believing in this, the corporation with which the writer is affiliated created a special department to make further study of its oil cracking pressure vessels in the field. This department has been in existence over one and one-half years. However, many of the oil cracking pressure vessels manufactured by this corporation have been under operation for more than four years, consequently the findings from actual observation during this period of one year and one-half cover vessels which have been in service, one, two, three and four years.

The findings have been mutually beneficial to both user and manufacturer, for by making numerous observations on vessels covering such a variable time in operation and variable use, the collective experiences and observations have been analyzed and crystallized into fundamentals that have led to greater safety in oil cracking. Therefore, at this time it seems appropriate to give to the oil industry any findings which will stimulate thought and action toward the elimination of hazards in the operation of oil cracking pressure vessels.

In an oil refinery, the pressure area presents the most hazardous conditions, for in cracking oil under elevated temperatures and pressures, one is completing and breaking down what nature failed to do. To do this is very hazardous even with constant uniform conditions. Moreover, to do this, with corrosion continually weakening the oil cracking equipment, is especially hazardous, and it is, therefore, doubly imperative that the oil cracking equipment be given constant, viligant care and maintenance.

Through experience in working about oil cracking plants, men become aware of the hazards of their work. The experience of a composite group of these men would undoubtedly reveal many of these hazards, but as the economic necessity for cracking is of recent origin, the experience man has had in the operation of cracking plants is limited and there are still many combinations of adverse conditions which have not been experienced. Certainly any known condition which may become hazardous should be instantly eliminated from the cracking operation. Men actually working in such plants are keen on their elimination.

TO STIMULATE THOUGHT ON HAZARDS

The purpose of this article is to stimulate thought on the elimination of all known hazards in the operation of oil cracking pressure vessels.

Oil cracking equipment is subjected to the most hazardous conditions. Men operating plants are aware of some of the hazards and are keen on elimination of all hazards which can be greatly reduced by embodying a known factor of safety in the design. There is no absolute safety regardless of design.

The degree of absolute safety obtainable is dependent on the thoroughness with which the cracking operation, practice, and process layout are analyzed and controlled with regards to hazards.

Uniform routine practice leads to greater safety and more uniform results.

Periodical inspections and testing of all equipment are fundamental to safety.

Failure to make correction for the deterioration of oil cracking equipment is criminal.

All known operating conditions should be taken care of in the design of equipment which should have a safety factor adequate to compensate for unknown and uncontrollable conditions. The plant layout and routine practice should be analyzed and then crystallized into a standard practice.

The elimination of water in the cracking of oil is imperative.

The oil cracking pressure equipment should be regularly tested at the beginning of each cycle. The oil cracking pressure vessels should be periodically proof tested hydrostatically. The equipment should be periodically inspected and tested for corrosion losses.

The established operating practice on a commercial cracking process should never be changed by the layman operator.

The pressure vessels should be operated continuously within the designed working pressure and temperature.

No Absolute Safety

At this stage of development in the art of cracking there is no absolute safety regardless of design. If one but knew all the adverse or combination of adverse conditions which can be brought about in the commercial cracking of oil at high temperatures and pressures then one could design for the maximum of these adverse conditions and with a suitable safety factor would approach absolute safety.

Since the advent of oil cracking there have been rapid strides made in the improvement of oil cracking equipment with a trend ever towards greater safety. These improvements have been made by embodying a known factor of safety in the design of this oil cracking equipment. Naturally the factor of safety of equipment in which guess-work (as far as design and material is concerned) has been eliminated, need not be as high as that upon equipment which has not been improved and in which the actual factor of safety is not accurately known. From analyzing the composite, collective experiences obtained from operating oil cracking equipment, one can arrive at the known conditions to which this equipment may be subjected and by research ascertain the actual factor of safety of the equipment. However, in the accurate design it will still be necessary to embody a safety factor sufficient to take care of unknown and uncontrollable conditions.

The degree of absolute safety secured in the cracking of oil is dependent not only upon the oil cracking equipment but to a great degree upon the thoroughness with which the cracking operation and cracking plant layout are analyzed with regards to hazards. This analysis should reveal points in the plant layout where unforeseen conditions may set up an adverse condition. Sometimes this one condition by itself may not be hazardous, but should any other adverse condition occur at the same time, the combination of these two might be sufficient to bring about a catastrophe.

Dehydration

Furthermore, this analysis should pay particular attention to the elimination of any water from getting in or accumulating in the oil cracking equipment. The dehydration of charging stock is to be commended, but even though this is apparently accomplished, the source of supply of charging stock should be carefully controlled. The manner of drawing oil from the charging stock tanks should be fixed. These tanks should be periodically cleaned and drained and as a final check, the condition and source of the charging stock should be ascertained by the pressure still man at the beginning of his shift. In the cracking plant layout and hook-up there should be no places for water to accumulate in the cracking equipment before or during operation. Means must be taken to eliminate dead pockets where water may settle out. When in operation, lines which have connections or valves remote from the pressure vessels should never be rammed into the oil cracking vessel or process.

It seems entirely wrong that with the changing of the operating personnel from one shift to another, it would be continuously necessary to make changes in the routine operating practice and that each shift should have its own particular practice. Undoubtedly, there are many ways of accomplishing the same thing, but the safest way is the correct and most economical. This way should be ascertained, adopted, and uniformly practiced. The operating personnel of the cracking plant should be carefully instructed and examined in the routine practice which has become standard for their particular plant. The results over a period of time will be much more uniform, with a greater degree of safety. The greatest safety will be derived when there are changes to be made in the operating personnel.

The periodical inspection and testing of oil cracking equipment is fundamental to safety. This is generally accepted in theory but not so generally practiced. Many cracking plant superintendents think there equipment is free from corrosion. But invariably, out of a clear sky, they are made to realize that cracking plant corrosion is not necessarily a respector of any person, process, or particular equipment. The degree of corrosion is influenced by many variables, but if ignored will eventually impress itself upon the refiner, even though he does not wish to recognize it.

One may readily be misled into thinking that there is no corrosion in his cracking equipment, particularly after steps have been taken with some recommended means of combating this corrosion, and then no means taken to definitely ascertain what the corrosion is in different parts of the equipment. To definitely know whether there is corrosion in oil cracking equipment one must either drill corrosion test holes or hammer test. In a large percentage of cases, it is highly advisable to do both.

On oil cracking pressure vessels an inspection is not nearly so complete or thorough unless the internal surface of the vessels has been cleaned down to the bare metal. The best way to prepare a vessel for an inspection is by sandblasting. Even then it is highly advisable to inspect the surface before it rusts or corrodes.

An inspection following sandblasting will reveal the points of greatest corrosion, and at these points test holes should be drilled through the wall of the equipment to ascertain the loss of wall thickness due to corrosion or other phenomena or a combination of the two.

Working Stresses

In speaking other phenomena, there have been cases where there has been an exceptional amount of corrosion in oil cracking pressure vessels around openings and in other particular parts of the vessel. A large percentage of such conditions have been brought about by accelerated corrosion due to the concentration of working stresses. In other cases where stresses have been excessive at elevated temperatures, creeping of the metal as well as corrosion has reduced the wall section. Such conditions are the result of weaknesses in design.

In addition to corrosion and weaknesses in design, there are several other reasons which make it fundamental to inspect and test oil cracking equipment; namely, defective workmanship, defective materials, and lack of control of operating conditions. As stated above in regard to oil cracking pressure vessels, unless the internal surface of the vessel has been cleaned down to the bare metal, an inspection will not necessarily reveal or bring out conditions in the oil cracking vessel, which may eventually become hazardous.

A regular hydrostatic test applied to the oil cracking equipment will result in a safer operation. Such tests should be applied at the beginning of each cycle of operation, using the regular charging stock as a liquid for testing, and creating an internal pressure greater than that used in operation.

Since the oil cracking pressure vessel, because of its size, is generally operated at a greater unit strain than the rest of the cracking equipment, it is highly advisable to periodically proof test this vessel with a liquid at a temperature of 70° F., using approximately three times the operating pressure. This higher pressure will tend to develop any immediate hazards in the vessel. In making this hydrostatic test it is advisable to use a liquid that will not cause a disaster

(Continued on Page 203)

Problems in Application of Control

Modern Manufacturing Methods Require Instruments Which Will Assure the Proper Balance in All Phases of Operation

By C. E. Mason
Physicist, The Foxboro Co.

Perhaps the most striking impression created by a visit to one of the old refining districts, such as Oil City, Pa., is a realization of the vast improvement in refining methods.

From almost any vantage point—and they are quite plentiful on either side of old Oil Creek—one can see a representative type of almost every refining method, from the crudest discarded "cheese-box" stills to the most modern concentrated and highly efficient units.

In briefly analyzing these developments we can not help but feel that one of the major factors in obtaining such concentrated and efficient methods is the application of the principles of control. We might even say automatic control, not in the sense of control being obtained by the use of automatic instruments, but in the sense that the equipment is designed by refining engineers so familiar with the physical reactions that these reactions are completely balanced within themselves.

In obtaining these balances, which represent the highest operating efficiency, it is necessary to control some reactions which are influenced by outside factors.

Although external controls of pressures and temperatures are important in compensating for outside influences, the primary factor which insures internal balance is a positive control of charging rates.

Instruments designed to control charging rates automatically have been called "flow controllers" and are in reality controlling orifice meters. In as much as the fluid being controlled is noncompressible, it is possible to control the flow by controlling the differential across a desirable orifice plate, or in other words to control a constant velocity through a given opening.

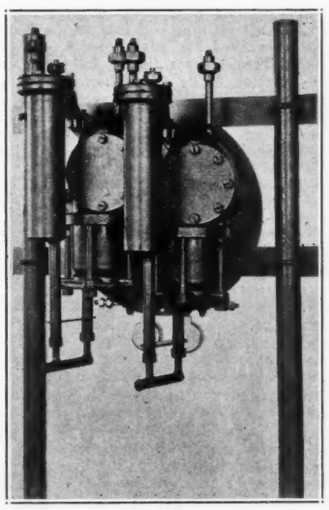
The application of the principle of flow control is quite simple, it being necessary only to operate properly a controlled valve either directly in the line of flow, or on the steam line to the charging pump. In order to obtain the most successful results it is very desirable to consult the instrument manufacturer for the proper controlled valve sizes and correct methods of installation for any particular problem.

Flow controllers have been used for several years on many successful applications up to pressures of 800 pounds. In order to meet the widespread demand for such an instrument, manufacturers have recently developed a flow controller capable of controlling flows in lines under pressure as high as 3,500 pounds per square inch, thus making them applicable to any high pressure process.

Flow controllers have also been used successfully in many other applications, such as controlling the flow of acid and caustic to treating plants, the rates of mineral seal oil circulation in absorption plants, and rates of flow of reflux in stabilizing units.

Where the rates of flow of two or more fluids may be controlled constant and the rates should bear a certain relationship to each other (such for instance as the flow of acid, caustic, and oil in a treating plant), separate flow controllers on each individual line will give a very close and efficient control and still retain sufficient flexibility to meet the requirements of changing proportions; i.e., if it becomes desirable to change the rate of flow of one or all of the liquids it is only necessary to set the controller to a new control point.

Such combinations of flow controllers have been called proportionate control in order to distinguish them from ratio controllers which are quite different in principle. In using the proportionate control principle the desired ratios are obtained by using orifice plates with equal coefficients (or if the ratios are widely different the coefficients may be in ratios of 10), and maintaining the differentials so that their square roots are in the proper proportion. This is greatly simplified by using a square root chart since it is then only necessary to



Ratio flow controller showing two sets of differential chambers.

set the control points to the desired chart reading. The decided advantage in this method of controlling ratios is that the ratios can be varied at will.

Ratio Flow Controller

Sometimes, due to the conditions of the process, the flow of one fluid, which we shall call the secondary fluid, should bear a definite ratio to the flow of another fluid, which we shall call the primary fluid, but the conditions are such that the rate of flow of the primary fluid can not be controlled. To meet conditions of this sort the ratio flow controller has been developed.

This controller is based upon the same fundamental principle as the flow controller, but is constructed with two sets of differential pressure chambers. One set is connected up to the orifice in the primary line and the other to the orifice in the secondary line. The differential pressure created by the flow of the primary fluid operates the setting device of the control mechanism in the secondary or controlling instrument in such a way as to maintain their differentials equal. With such an arrangement, although the rate of flow of the primary fluid varies considerably, the rate of flow of the secondary fluid will always be in direct ratio to the flow of the primary fluid, the numerical value of this ratio depending upon the choice of orifice size.

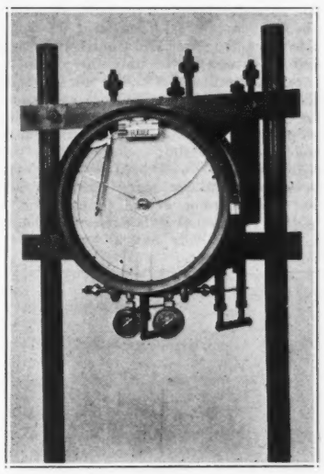
The ratio flow controller has been most widely used in absorption plants to maintain the proper ratio of lean oil to wet gas entering the absorber and to maintain the proper ratio of steam to fat oil entering the still.

Use in Absorption Plants

In the application of a ratio controller to an absorber the wet gas is the primary fluid and the lean oil, which is the one under control, is the secondary fluid. Although practically all gasoline plants are operated at constant pressure, the ratio flow controller does not depend upon this condition for satisfactory operation.

Unless there is a decided change in the gasoline content of the gas or vapors being treated, there is no necessity for changing the ratios of gas to oil except to compensate for changes in pressure. The flow curves representing these corrections for pressure are practically identical with the corrections for change of differential across an orifice plate due to changes of pressure. Since the ratio controller maintains both differentials equal, it is quite apparent that the ratio controller automatically corrects the oil flow for changes of pressure in the gas line.

A given volume of gas at a given pressure will require a certain amount of oil circulation to the absorber. If the orifice size in the gas line is selected so that with minimum line pressure and maximum volume the differential would be indicated by the maximum reading on



Ratio flow controller.

the instrument, and if the orifice size in the oil line is such that with this same differential it would pass a quantity of oil that would establish a desirable ratio under the given conditions of pressure, a ratio controller would maintain this same ratio for any variation in pressure that still permitted the differential pen of the gas system or primary instrument to remain within its range.

In the same way that flow controllers give records from which flows may be calculated, the records from ratio controllers may be used to calculate flows of oil as well as flows of gas, if the gas pressure is controlled constant. If it is necessary that the gas pressure be permitted to vary, a recording pressure gauge connected to the downstream side of the orifice plate in the gas line will complete the records necessary to compute the gas flow.

In the application of the ratio controller to maintain a constant ratio between the quantity of steam and fat oil entering the still, the fat oil is the primary and the steam the secondary fluid. It is possible to control the quantity of steam by controlling only the differential because the orifice may be installed downstream from the controlled valve, or in such a location that the pressure at the orifice will be equal to the pressure in the still, and therefore remains constant.

The differential recording controller, which is the basic instrument of both flow controllers and ratio controllers, is very successfully used in another application which is commonly called liquid level control, but which in a broader sense is quite similar to flow or ratio control.

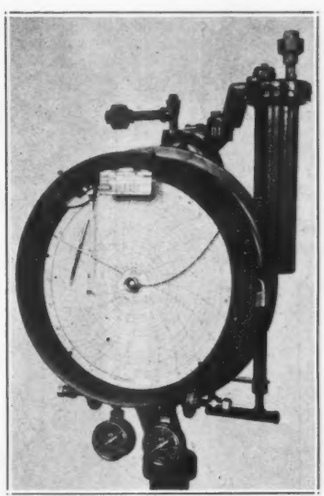
Time Element

In any application of liquid level control we are endeavoring to control outlet flows equal to or proportionate to inlet flows, or vice versa. The element of time determines the class into which all liquid level control applications fall.

Applications in which it is desirable that the inlet and outlet quantities be equal or proportionate over very short intervals of time fall into an entirely different classification than those in which it is only necessary that the inlet and outlet quantities be equal or proportionate over a much longer period of time. The former applications practically require that the inlet and outlet rates be equal or proportionate; in the latter applications it might only be desirable that the container does not overflow or drain empty.

In some applications it is desirable that the outlet rate remain more constant than the inlet rate. In these applications we are not so particular about the outlet rate being equal to or proportionate to the inlet rate, but we are nevertheless desirous of having the outlet quantity over a longer period of time equal to or proportionate to the inlet quantity. The volumetric contents of the container in which the liquid level is being controlled determines this time element.

Such liquid level control problems are ordinarily presented to the instrument



Flow controller.

manufacturers by customers stating that they prefer the liquid level to vary over a certain range or that they prefer that instruments be so adjusted as to operate the controlled valve from a fully open position to a completely closed position with a variation of liquid level corresponding to 20, 40, 50 or even 100 per cent of the total range of instrument. If this problem is to be considered in its entirety we must consider that although the instrument might be designed to permit this variation in level, the outlet rate of flow must always be proportionate to the permitted change in level. It would, of course, be possible to accomplish a somewhat more desirable

(Continued on Page 259)

Distillation Methods Change Rapidly

Tube Stills of Various Types Have Replaced Shell Stills in Modern Plants. Several Illustrations Cited

Oil refining has progressed so rapidly and in so many different ways that quite a long history would be required to cover the whole situation. To take a single important phase of modern refining and show the transition by describing what has actually taken place will throw definite light upon the subject.

About 1923 an independent oil company, which has since grown to be one of the larger refineries on the Pacific Coast, built a new refinery in Southern California having a capacity of 20,000 bbls. per day. Tube stills and towers were used exclusively with the exception of two small shell stills for rerunning to manufacture special naphtha distillates. Since that time the capacity has been increased to 55,000 bbls. per day, all refined in tube stills and towers, as even the two shell stills originally installed have been abandoned.

A year or two earlier another oil company installed three tube stills and tower units, each having a capacity of 5,000 bbls. per day, in a refinery in southern Texas, and a fourth 5,000-bbl. unit has since been added and plans are under way for further expansion. This refinery is entirely dependent upon tube stills and towers for their preliminary distillation running down to fuel oil and recovering gas oil overhead for charging stock to their cracking units.

A large eastern refining company, after careful comparison of operating costs of their existing shell stills with what can be accomplished with tube stills and towers, decided that they could not afford to continue operating their shell stills and replaced them with tube stills and towers. The first battery of three tube stills with a crude capacity of approximately 15,000 bbls. per day total replaced three batteries, a total of 52 stills of the old type of coke still. The results obtained greatly exceeded their expectation both as to products produced and refinery costs, and this company has since added four 5,000-bbl. pipe still units. All of these units are used to reduce Mid-Continent and other crudes to flux and asphalt bottoms, recovering the other products overhead from the top of the tower and as side streams. As the result of this installation about 200 shell stills have been abandoned in this one refinery, and three smaller refineries of this same company have also abandoned their shell stills and are now entirely dependent upon tube stills.

Replacing Shell Stills

Another eastern refining company installed at one of their refineries a crude unit having an atmospheric and a vacuum stage and a rerun unit, all of the tube still type, which replaced about 30 shell stills. This same company at another of their refineries has installed an atmospheric-vacuum two-stage unit of 5,000-bbl. capacity for coastal crude, an atmospheric-vacuum two-stage unit of 7,500-bbl. capacity for Mid-Continent crude, and an atmospheric unit for rerunning paraffin distillate of 1,800-bbl. capacity. This company is now seriously considering the replacement of a battery of shell stills which have been in operation for not more than four years with a tube still and tower unit because their experience over the last three years indicates that they cannot afford to continue to operate their shell still battery, although it is comparatively new.

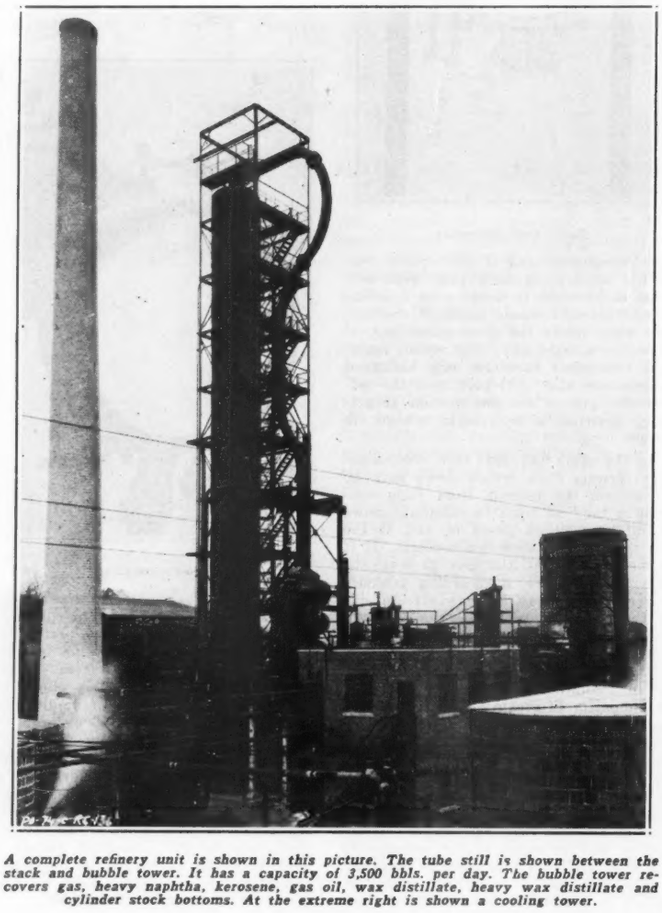
One of the largest refining companies in the Pennsylvania field, refining a paraffin base crude, has installed tube still and tower equipment which has replaced upwards of 20 shell stills. This company has a battery of shell stills which was completed less than two years ago. These they continue to use only as an atmospheric topping stage, taking off the lighter products, the bottoms from these shell stills being run to a vacuum unit of the tube and tower type where the bottoms of the atmospheric stage are reduced to cylinder stock.

Another refining company in the Pennsylvania field has shut down all of the shell stills in its refinery, following the installation of an atmospheric tube still and tower unit, with the exception of a number of shell stills which are used for rerunning pressed wax distillate and cylinder stock solution. They contemplate replacement of these shell stills at an early date by tube still and tower units.

Early in 1927 still another refining company in the Pennsylvania field replaced six existing shell and cheese-box stills with an atmospheric unit of the tube still and tower type, and have since installed a larger atmospheric unit of the tube still and tower type, bringing the capacity of the refinery up to 12,000 bbls. per day.

The refining companies in Pennsylvania probably represent the most conservative practice in refining methods because of the comparatively high price of the paraffin base crude which they refine, and it is interesting to know that notwithstanding this conservatism approximately 85 per cent of the total run of Pennsylvania crude is now refined in units of the tube still and tower type.

Foster Wheeler tube still, to the right, with air heaters, covered with insulation, at the left. This still is designed for 4,000 bbls. per day. The products obtained from the bubble tower shown to the left of the still are naphtha distillate, kerosene distillate, and 31° A.P.I. bottoms.



A complete refinery unit is shown in this picture. The tube still is shown between the stack and bubble tower. It has a capacity of 3,500 bbls. per day. The bubble tower recovers gas, heavy naphtha, kerosene, gas oil, wax distillate, heavy wax distillate and cylinder stock bottoms. At the extreme right is shown a cooling tower.

A Foster Wheeler tube still operated in connection with a cracking plant. The capacity is 7,200 bbls. per day, and it will be seen that the hot gases from the still are passed through a plate type air heater before being delivered to the stack by an induced draft fan.

TEMPERATURE CONTROL IN THE OIL INDUSTRY

(Continued from Page 189)

and flue gas temperature recorder. The three furnace records show the temperatures of the three thermocouples arranged across the furnace to measure the temperature of the hot gases immediately after they pass over the bridge wall. The fireman is expected to keep these three temperatures together on his chart and to make necessary manual adjustments to any one of the burners when that particular temperature is observed to be lower or higher than the other two. In this way the fireman is forced to watch the condition of the burners in keeping them balanced and he will detect improper flame conditions through these occasional adjustments which must be made from time to time.

The control of the hot oil outlet of a tubular oil still involves a combination of factors, each of which affects the final results obtained. For this reason hot oil control is more complicated than a simple furnace control, and these several factors may be combined in a number of ways to make up a particular system of control.

In general, however, it has been demonstrated that a steady average furnace temperature and a constant throughput will produce a fairly steady hot oil outlet temperature.

A few words of explanation may be needed. The hot oil outlet temperature will change, even with steady pump speeds and steady furnace temperatures, but such changes will be fairly gradual. Among the factors which may produce this change are: Changes in stack draft, changes in atmospheric conditions, changes in oil inlet temperature, changes in evaporator tower level, accumulation of coke in tubes, accumulation of soot on tubes, etc. Without going into detail, it will be sufficient to state that furnace temperature alone is not a true measure of the average heating effect on the oil. This may be considerably modified by changes in the position of the dampers. It is generally recognized, however, that the best operating conditions are obtained with a very large amount of excess air and for this reason the dampers are usually left fairly wide open and are not often changed. Occasionally the operator will open the front dampers wider when he sees that the front roof tubes are carrying too much of the load, and will throw part of this load on the tubes in the back of the furnace which are heated by convection. These changes, however, must always be made manually and directed by the intelligence of the operator. For all practical purposes, then, it is sufficient to regard the average furnace temperature as a measure of the heating effect on the oil.

General Conclusions

Analysis of these factors results in the following general conclusions:

1. It is extremely difficult to rapidly adjust the furnace temperature of a large tube still furnace.

2. A sudden change in hot oil temperature is very likely caused by a variation in throughput and not by a sudden change in furnace conditions.

3. It is not only difficult to suddenly change the average furnace temperature to compensate for small changes in hot oil outlet temperature, but it is also undesirable from the standpoint of wear and tear on furnace lining, possibility of increased coking of tubes, flame impingement, less efficient combustion, etc.

4. If a sudden change in hot oil temperature is usually caused by a variation in throughput, the logical corrective action is to bring the throughput (hot-oil circulating pump) back to its normal value.

5. It is useless to try to swing a large furnace up and down in temperature simply because the throughput varies up and down for short intervals of time. By the time the furnace can assume a new temperature, the chances are that the throughput has returned to normal, and then the furnace must again be changed back to its former temperature.

Study of these conclusions resulted in the devolpment of a hot oil control consisting of the combination of a furnace controller and a hot oil pump speed controller. The furnace control instrument maintains the furnace at an average temperature as measured by three thermocouples in series located across the back wall of the furnace. The hot oil pump controller consisted of a mechanism controlling the supply of steam to the hot oil circulating pump. This mechanism was actuated from a narrow range hot oil control instrument connected to a thermocouple in the transfer line.

With this system, when the hot oil temperature changes a degree or two, the hot oil controller corrects the speed of the circulating pump to bring the hot oil temperature back to the desired normal. The furnace temperature is manually set by the operator to maintain a definite average furnace temperature. In order to maintain any desired throughput it is merely necessary for the operator to occasionally adjust the setting of the furnace control instrument. For example, if he finds that over a period of time the number of strokes of the hot oil pump are decreasing gradually, he merely sets up the furnace control instrument so that it maintains a furnace temperature of perhaps 10° or 15° higher.

With this system the furnace is allowed to run steadily sometimes for several hours at a definite temperature, and the temperature is changed only when it is necessary to make this change in order to maintain the desired throughput. The changes in the hot oil pump speed are very small and are temporary changes. As a result there is no sacrifice of throughput or yield, and the operator has entire control of his three main factors: Furnace temperature, throughput and hot oil outlet temperature. The combination is very flexible and the operator can maintain the desired throughput by raising his furnace temperature or he may sacrifice some of the throughput in case he does not desire to run the furnace any higher. Again, he may gradually lower the hot oil outlet temperature if the unit is nearing the end of the run, and if it is undesirable to slow down the circulating pump.

Tower Control

The control of the vapor outlet of a fractionating tower or dephlegmator has been handled with fairly satisfactory results with a simple "on and off" control mechanism. The control obtained has been close enough for practical purposes and it possesses the desirable features of simplicity and low cost. These tower controls were applied principally to those systems in which a cooling medium was circulated through a closed coil at the top of the tower. The thermal capacity of this cooling coil and the capacity of the tower itself smooth out the temperature fluctuations produced by the sudden surges of the cooling medium through the coil.

Another type of tower offers a more difficult problem. This type of tower uses the so-called reflux control which consists in spraying the liquid directly into the tower. There is practically no thermal capacity to smooth out the effect of variations in this spray and for this reason the on and off control has not been successful. The same problem arises in connection with fractionating towers on pipe stills which are sometimes very sensitive.

Experiment with the latest type of control instruments promises excellent possibilities in the control of tower temperatures.

CONTINUOUS OPERATION IN CRACKING EQUIPMENT

(Continued from Page 200)

should a weakness be developed. Such proof test should be applied to the oil cracking vessels regularly, the time interval being greatly affected by the rate of corrosion.

Inspection and Testing

The time interval between the periodical inspection and testing of oil cracking equipment is dependent upon many factors and cannot be definitely set for a particular unit or battery until after several such inspections are made and the results carefully analyzed. At the starting up of a unit or battery, it is recommended that an inspection and test be made, and again every six months until several such inspections have been completed. The final analysis of these inspections should reveal what should be the approximate period for such inspections.

The supervision and control of all testing and inspection work will depend upon the amount of oil cracking equipment in use in any refinery and upon what basis it is operated. Some plants can economically carry an independent department for this work. Others will find it advisable to have specialists come in at stated intervals. The operating department can take care of certain tests and inspections, as for example, the regular hydrostatic testing of the oil cracking equipment at the start of each cycle of operation should be carried out by the operating personnel, using the regular charging stock as the testing medium.

As stated before, the general trend in the operation of oil cracking equipment is towards greater safety. This is a step in the correct direction and anyone who is not in step with this trend is hindering progress and inviting disasters. Should such disasters be frequent enough necessary steps will, undoubtedly, be taken to form an oil cracking pressure code. Certainly a failure to make corrections for known weaknesses and corrosion losses in oil cracking equipment is criminal and may eventually be dealt with as such.

Conclusions

If thought is given to the above subject, it is believed that the following conclusions will follow:

First. All known operating conditions in a cracking cycle should be taken care of in the design of the oil cracking equipment, and in addition the design should have a factor of safety adequate to compensate for unknown and uncontrollable conditions.

Second. There is no absolute safety in oil cracking regardless of the design.

Third. The cracking plant layout and routine practice should be analyzed with regards to hazards and the findings crystallized into a standard form.

Fourth. The preventing of water from getting in or accumulating in oil cracking equipment is imperative.

Fifth. The oil cracking pressure equipment should be regularly tested at the beginning of each cycle of operation. In addition such equipment should be provided with a safety valve.

Sixth. Oil cracking pressure vessels should be periodically proof tested hydrostatically.

Seventh. The oil cracking pressure equipment should be periodically inspected and tested for corrosion.

It is believed that for continuous operation in oil cracking pressure vessels with a high degree of safety that the oil cracking pressure vessel should be operated within the designed working pressure and temperature. Also, that the established operating practice on a commercial cracking process should never be changed by the layman operator. If methods or practice warrant changing, the experimental work should be carried out on a unit or battery set aside for this experimental work. Thus, if anything happens, the public can be readily satisfied by the fact that it was an experimental unit or battery. On a commercial unit or battery the public have a right to question explosion and to know the truth.

Therefore, for continuous operation with a high degree of safety my company is desirous of having its vessels worked within the designed working temperatures and stresses. It believes that such a practice is the most economical and that it is in accord with the thoughts of the best operators in the art of cracking.

KENTUCKY-TENNESSEE

(Continued from Page 82)

on the Homer Martin farm, near Buford. The Ohio Oil Co.'s No. 6, on the Whittaker farm in the Whittaker Pool, produced 35 bbls. initial. This well is in the southwest corner of the farm. Boop & McDonough found a dry hole in the Jett sand on the C. W. Newton farm. J. M. Meredith and others' test on the Lydia Carter farm, in the Deanfield area, is a duster.

In Warren County, southwest of Bowling Green, O. C. Wood's No. 4 well, 550 feet from the north line and 95 feet from the west line of the John Q. Adams, pumped but 2 bbls. initial at a total depth 1,068 feet.

Field Pick-Ups

Many rigs were set to start drilling when the 60-day shutdown was passed, but another 30 days added means that little will be done in the Tri-County or Owensboro Field until after March 15.

Ellis, Young & Howe are making a deep test of No. 3, on the Rice-Woodson lease, in the Greenville Field of Muhlenberg County, and expect to go to a total depth of 3,000 feet.

James C. Ellis and others expect to drill in No. 1 on the Edward Tett farm, which is an offset to No. 3 on the R. O. Kennedy farm, in the Greenville Field of Muhlenberg County, within a few days. This well has been delayed by a fishing job.

In the Buford area of Ohio County, the Kemrow-Cumberland companies are drilling No. 11 on the Cicero M. Wade farm. Smith and others are drilling No. 5, W. J. Dawson farm. Hupp, Duff and others are drilling No. 5, J. A. Stewart farm, and the Kemrow-Cumberland Co. is drilling No. 3, W. Hamilton farm, in the Buford area.

Sam T. McGill and others are reported shut down at No. 3 on the Leo Roseblatt farm of 60 acres in Hancock County.

EASTERN FIELDS

(Continued from Page 86)

building a rig on the J. J. Moore farm. In Ravenwood district, Jackson County, the Heck Oil Co. is building a rig on the B. A. Shafer farm.

In Sheridan district, Calhoun County, B. J. Crowley & Co. have the rig completed on the Jefferson Bennett farm. In Center district the Hope Construction & Refining Co. has the rig completed on the C. F. Hosey farm, on Big Root Creek. At the mouth of Sheep Run, Grant district, Ritchie County, H. N. Rinehart has the rig up for another test on the Daniel Donnelly heirs' farm. In the same district the Hope Natural Gas Co. is building a rig on the Lavina McFarland farm.

SOUTHWEST PENNSYLVANIA

In Perry Township, Greene County, the Peoples Natural Gas Co. has completed a small gasser on the Casby Johnson farm. In Whitly Township, same county, the Equitable Gas Co. has completed at a depth of 3,270 feet a test on the Floyd Smith farm. It is a fair gasser. In Wayne Township the same company has a fair gasser on the J. F. Church farm.

In Patton Township, Allegheny County, the T. W. Phillips Gas & Oil Co. has completed a gasser on the Megi farm. In Plum Township, Allegheny County, the McCurdy Oil & Gas Co. has a gasser on the Mrs. A. Stewart farm. In the same township the Woodings Forge & Tool Co. is drilling on the Woodings Forge & Tool Co. property.

In Morris Township, Greene County, Fox & Foley have a gasser in the 50-foot sand at No. 5 on the D. K. Phillips farm. In Center Township, George Drake and others are rigging up on the Dean Piatt farm. In Aleppo Township the Manufacturers Light & Heat Co. is due in the Big Injun sand on the B. R. and Alice Chambers farm. In Springhill Township the Cameron Oil & Gas Co. has a rig up on the Margaret Cameron farm.

In Ohio Township, Beaver County, J. L. Abrams has completed a test on the Davidson farm. It has a very small showing of oil and will likely be abandoned. In the same township, Leapold Rossomma has completed No. 5 on the Rossomma-Guyox farm, showing for a very light pumper.

MADE TO MEET EXACTING STANDARDS

MARATHON Gasolines and Motor Oils are made to meet exacting standards.

These products are backed by a tremendous organization engaged in the production of superior motor fuels and lubricants . . . MARATHON Gasoline, MARATHON Ethyl Gasoline, and MARATHON Motor Oils. These products are GUARANTEED by their makers, who are bound by tradition and purpose to keep their guarantee inviolate, insuring that the quality of MARATHON and the confidence of the public shall endure.

TRANSCONTINENTAL OIL CO.

Producers, Refiners, and Marketers of Marathon Quality Products

GENERAL OFFICES Thompson Building TULSA, OKLAHOMA

WEST TEXAS FIELDS

(Continued from Page 91)

No. 21 Roberts had initial production of 212 bbls. after shooting 200 quarts at 2,520-75 and 120 quarts at 1,930-50 feet, top pay 2,520 feet and total depth 2,575 feet.

Pecos County

Dixie Oil Co.'s No. 1 Torborg had initial production of 95 bbls. per day, top pay 325 feet, total depth 440 feet. Black & Dittman's No. 1 Pecos Valley Oil Co. had show gas 1,495-98 feet increase 1,528-30 feet, initial production 200 bbls. oil and 1,800,000 feet gas per day, total depth 1,533 feet, top pay 1,530 feet. Cardinal Oil Co.'s No. 6 Torborg had initial production of 15 bbls. per hour from top pay 317 feet, total depth 385 feet. Cardinal Oil Co.'s No. 1 Tippett (Pure) was dry and abandoned at 500 feet. McMan Oil & Gas Co.'s No. 12-D Smith had 150 bbls., top pay 1,490 feet, total depth 1,580 feet. Southern Crude Oil Purchasing Co.'s No. 3-A Tippett produced 17 bbls. per hour from top pay 315 feet, total depth 400 feet. Taylor-Link Oil Co.'s No. 10 University produced 50 bbls. from top pay 1,566 feet, total depth 1,572 feet. Taylor-Link Oil Co.'s No. 12 University had initial production of 20 bbls., top pay 1,655 feet, total depth 1,691 feet.

Reagan County

Big Lake Oil Co.'s No. 174 University had 175 bbls., top pay 2,928 feet, total depth 2,935 feet. Big Lake's No. 177 University produced 100 bbls. from top pay 2,900 feet, total depth 2,911 feet.

Upton County

Texas Pacific Coal & Oil Co.'s No. 1 Reese had initial production 250 bbls., top pay 2,480 feet, total depth 2,547 feet.

Ward County

Penn and Atlantic's No. 2 Cooper was dry and abandoned at 2,880 feet.

Winkler County

Republic Production Co.'s No. 1-A Grisham & Hunter had top pay 2,800 feet with increase at 2,865 feet, second pay at 2,941 feet, increase 2,993 feet, initial production was 6,010 bbls. of pipe line oil, total depth 2,995 feet. Bashara's No. 2 fee had initial production of 40,000,000 feet gas and 37 bbls. oil per day, top pay 303 feet, total depth 3,030 feet.

PIPE LINE RUNS

February 12 to February 19
Runs Through Trunk Lines

	Last period
Atlantic P. L. Co., Port Arthur	27,000
Gulf P. L. Co., to coast, via Ranger	44,978
Humble P. L. Co., Comyn, Tex.	41,912
Humble P. L. Co., Ingleside	26,099
Illinois P. L. Co., Del Rio, Tex.	48,372
Magnolia P. L. Co., De Leon, Tex.	7,754
Pasotex P. L. Co., El Paso, Tex.	13,100
Shell P. L. Co. to Healdton, Okla.	30,140
Shell P. L. Co. to Houston, Tex.	25,052
The Texas Company, Houston, Tex.	20,638
Total	285,045

Tank Car Shipment

Big Spring P. L. Co., Big Spring	....
Humble O. & R. Co., McCamey	168
Landreth Prod. Corp., Crossett	....
Reagan County Pur. Co., McCamey	....
Thomas & Brann, Grant City	100
Orient Co., McCamey	100
American Pet. Co., Pyote	....
Southern Crude O. P. Co., Wickett	19,947
Total	20,315

Runs to West Texas Refineries

Bluebonnett Ref. Co., Wickett	1,110
Burford Ref. Co., Pecos	3,675
Col.-Tex. Ref. Co., Colorado	7,000
Cosden Ref. Co., Big Spring	10,437
Great Western Ref. Co., Big Spring	3,501
Humble Oil & Ref. Co., McCamey	9,845
Mid.-Tex. Ref. Co., Midland	....
Tonkawa Ref. Co., Pyote	2,544
Big Spring Ref. Co., Big Spring	735
Richardson Ref. Co., Big Spring	3,007
Wickett Ref. Co., Pyote, Tex.	150
Total	42,004

Summary

	Last period	This period
Pipe line runs through trunk lines	289,192	285,045
Tank car shipments	18,507	20,315
Runs to West Texas Refineries	27,931	42,004
Total daily distribution	335,630	347,364
Total daily production	334,602	338,643
Daily average from storage	1,028	8,721

PECOS COUNTY

Week ending February 25

Company, lease—	Wells	Prod.
Arkansas Gas & Fuel:		
University	1	....
M. H. Black:		
Fee	1	19
California Co.:		
Yates—Lease 1	19	9,750
Smith—Lease 1, Sec. 37	6	592
Smith—Lease 1, Sec. 23	8	2,699
Smith—Lease 1, Sec. 21	6	1,029
Smith—Lease 2	3	101
Smith—Lease 3, Sec. 26	13	2,457
Smith—Section 16	2	12
Tippett—Lease 1	1	29
University	1	38
Cardinal Oil Co.:		
Torborg	2	135
Continental Oil Co.:		
Yates-A	4	526
Salvage		3,747
University-A	4	220
Cosby Drilling Co.:		
Smith	3	460
Cranfill & Reynolds:		
Masterson	1	21
Dorn & McGee:		
Pecos Valley	1	12
Grayburg Oil Co.:		
Pecos River Bed	6	436
Salvage		373
Gulf Prod. Co.:		
All leases	44	17,607
Henshaw Oil Corp.:		
University	1	40
Humble Oil & Ref. Co.:		
Smith-A	13	1,675
Smith-B	7	1,078
Kirby Pet. Co.:		
Tippett	2	59
Kirby Pet. and Edson:		
Tippett	1	133
McCarty Oil Co.:		
Bennett	1	10
Gray	1	14
McMan Oil & Gas Co.:		
Smith-A	1	1,770
Smith-B	4	1,419
Smith-C	9	855
Tippett	3	315
Richardson	2	94
McMan & Continental:		
Yates	17	6,061
Mid-Kansas & Transcontinental:		
Yates-A	28	20,976
Yates-B	27	7,017
Salvage		170
Yates-C	11	8,047
Salvage		201
Yates-D	7	8,206
Yates-E	3	883
Yates-F	4	735
Yates-G	3	1,268
Yates-H	10	9,288
Smith	6	3,006
Smith-Taylor	19	4,498
Landreth Prod. Co.:		
University-A	7	1,648
University-C	3	769
University-D	3	116
University-E	2	127
University-F	3	110
University-G	3	127
University-H	1	19
University-I	1	....
Landreth and World Oil:		
University-B	7	1,448
O'Mara:		
Butz	1	16
Pecos Valley Oil:		
Fee, Section 22	8	158
Phillips Pet. Corp.:		
Monroe	2	152
Ramsey	4	1,043
Smith	3	676
Plymouth Pet. Corp.:		
Perry	1	30
Red Bank Oil Co.:		
Smith	5	456
Savoy-Mazda:		
Smith	3	649
Shell Pet. Corp.:		
Tippett	11	3,355
Smith-A	11	1,307
Smith-B	1	658
Smith-D	4	799
Smith-E	1	22
University-Bower	4	342
Simms Oil Co.:		
Smith	7	6,775
Southern Crude O. P.:		
Tippett	1	....
Skelly Oil Co.:		
Tippett	2	119
University	1	30
Taylor-Link Oil Co.:		
University	11	948
Transcontinental Oil:		
Matthews	1	74
World Oil Co.:		
University	1	64
Total Pecos Field	414	140,009

WINKLER COUNTY

Week ending February 25

Company, farm, Sec., Blk.—	Wells	Prod.
Amerada Pet. Corp.:		
Cowden, 3, B-12	3	17
Atlantic O. P. Co.:		
Hendricks-A, 34, B-12	7	1,563
Hendricks-B, 44, 26	6	554
Hendricks-D, 29, B-5	7	475
Hendricks-E, 41, B-5	5	934
Hendricks-G, 46, 26	1	7
Hendricks-F, 40, 26	12	497
Bankers Prod. Co.:		
Hendricks, 30, B-5	1	....
Brashara:		
Brashara	1	35
California Co.:		
Hendricks, 29, B-5	7	480
Continental Oil Co.:		
Hendricks, 33, 26	4	518
Hendricks-A, 29, 26	1	89
Hendricks-B, 34, 26	2	....
Cranfill & Reynolds:		
Hendricks-A, 28, B-5	2	213
Hendricks-B, 35, B-5	1	63
Hendricks-C, 33, 26	2	339
Hendricks-E, 33, 26	2	117
Cranfill and Texon:		
Hutchings, 47, 26	2	290
Culberson Bros.:		
Hendricks, 40, B-5	1	52
Eastland Oil Co.:		
Hendricks, 35, B-5	2	304
Hendricks-B, 46, 26	1	124
Gulf Prod. Co.:		
Hendricks-A, 34, B-5	12	4,660
Hendricks-B, 45, 26	10	4,517
Hendricks-C, 40, B-5	6	374
Hendricks, 44, 26	3	534
Cowden, 3, B-12	3	82
Humble Oil & Ref. Co.:		
Hendricks-A, 34, B-5	16	3,361
Hendricks-B, 29, B-5	6	1,196
Hendricks-C, 32, 26	8	400
Hendricks-D, 41, 26	1	342
Hendricks-B, 39, 26	3	198
Hendricks-C, 10, B-12	13	5,552
Walton-A, 8, 26	1	101
Walton-B, 47, 26	1	347
Independent Oil & Gas Co.:		
Hendricks-A, 34, B-5	7	658
Howe-B, 44, 26	3	95
McCabe, 36, B-5	2	145
Vardeman-B, 41, B-5	5	184
Lion Oil Co.:		
Hendricks-A, 41, B-5	11	1,593
Hendricks-B, 34, B-5	13	2,255
Hendricks-C, 45, 26	14	4,267
Hendricks-D, 44, 26	1	72
Magnolia Pet. Co.:		
Hendricks, 29, B-5	8	350
May Prod. Co.:		
Hendricks, 34, 26	1	10
American Maracaibo:		
Hendricks-A, 28, B-5	1	24
Hendricks-B, 28, B-5	2	83
Mining & Engineering:		
Hendricks, 10, B-12	1	....
Murchison and Cranfill:		
Hendricks-A, 35, B-5	3	347
Hendricks-B, 35, B-5	3	442
Hendricks-C, 35, B-5	1	....
Hendricks-H, 35, B-5	1	344
Hendricks-I, 34, B-5	1	70
Republic Prod. Co.:		
Hendricks-A-B, 45, 26	12	1,251
Hendricks-C, 41, B-5	5	91
Prairie Oil & Gas Co.:		
Hendricks, 40, 26	6	1,241
Cowden, 3, B-12	6	984
Shell Pet. Corp.:		
Hendricks-A, 45, 26	6	786
Hendricks-B, 29, B-5	6	1,770
Hendricks-C, 28, B-5	8	249
Hendricks-D, 41, B-5	6	95
Hendricks-E, 40, B-5	3	75
Hendricks-F, 46, 26	8	174
Hendricks-G, 39, 26	1	55
Shell-The Texas Company:		
Cowden-A, 3, B-12	6	1,081
Hendricks, 45, 26	6	2,611
Hendricks-A, 29, B-5	11	503
Hendricks-B, 40, 26	6	39
Hendricks-C, 40, 26	6	1,060
Hendricks-D, 40, 26	6	185
Hendricks-E, 39, 26	4	75
Skelly Oil Co.:		
Hendricks, 40, 26	12	2,459
Hendricks-B, 10, B-12	2	12
Hendricks-C, 30, 26	1	37
Southern Crude:		
T-67 Hendricks-A, 42, B-5	3	108
T-67 Hendricks-3-A, 4, B-12	6	217
T-67 Hendricks-B, 44, 26	5	250
T-67 Hendricks-3-B, 33, 26	5	526
T-67 Hendricks-C, 33, B-5	5	350
T-67 Hendricks-D, 27, 26	5	620
T-67 Hendricks-E, 42, B-5	4	73
T-67 Hendricks-F, 33, B-5	5	387
T-68 Hendricks-3-A, 35, B-5	3	100
T-68 Hendricks-B, 46, 26	2	122
T-88 Hendricks-A, 44, 26	6	521
T-88 Hendricks-B, 4, B-12	4	46
T-88 Hendricks-C, 28, B-5	8	890
T-88 Hendricks-D, 4, B-12	6	1,351
T-88 Hendricks-H, 28, B-5	7	516
T-88 Hendricks-I, 20, B-5	7	368
T-88 Hendricks-J, 30, B-5	5	361
T-88 Hendricks-K, 41, 26	7	752
T-88 Hendricks-L, 4, B-12	4	260
T-88 Hendricks-M, 35, 26	33	8,131
T-88 Hendricks-N, 28, 26	7	2,013
T-88 Hendricks-O, 22, 26	4	374
T-88 Hendricks-P, 28, 26	2	300
T-88 Hendricks-Q, 27, 26	2	2,123
T-88 Hendricks-R, 27, 26	3	3,550
T-88 Hendricks-S, 34, 26	4	2,430
T-88 Hendricks-T, 34, 26	7	660
T-88 Hendricks-U, 41, 26	10	939
T-88 Hendricks-V, 29, 26	1	57
T-88 Hendricks-W, 5, B-12	1	201
T-88 Hendricks-CX, 21, 26	4	802
T-89 Hendricks-A, 45, B-5	3	217
T-89 Hendricks-B, 35, B-5	2	263
T-89 Hendricks-C, 35, B-5	3	465
T-89 Hendricks-D, 35, B-5	1	144
T-89 Hendricks-E, 40, B-5	3	82
T-89 Hendricks-F, 40, B-5	2	218
T-88 Hendricks-H, 46, 26	2	103
T-89 Hendricks-I, 10, B-12	2	15
T-89 Hendricks-J, 9, B-12	8	534
T-89 Hendricks-L, 15, B-12	2	399
T-90 Hutchings, 47, 26	2	296
Texon Oil & Land Co.:		
Hendricks-A, 41, B-5	6	94
Hendricks-B, 45, 26	6	1,394
Total Hendricks Pool	573	87,729

LECK AREA

Atlantic-Kesslar & Logan:		
Leck, 3, 74	2	59
Amerada Pet. Corp.:		
Leck, 3, 74	2	214
Empire Gas & Fuel Co.:		
Daugherty, 3, 74	3	73
Magnolia Pet. Co.:		
Scarborough, 1, C-22	2	145
Gulf Prod. Co.:		
Scarborough, 1, C-22	1	50
Daugherty, 3, 74	1	421
Shell-Llano Oil Co.:		
Daugherty, 1, C-22	5	241
Shell-Danciger:		
Daugherty, 3, 74	2	52
Skelly Oil Co.:		
Daugherty, 22, 16	4	909
Tidal Oil Co.:		
Scarborough, 1, C-22	1	68
Prairie Oil Co.:		
Leck, 16, 74	1	449
Daugherty, 3, 74	1	109
Scarborough, 1, C-22	1	55
Warner-Quinlan:		
Leck, 3, 74	1	375
Total Leck Pool	27	3,220

O'BRIEN POOL

Continental Oil Co.:		
Morton-A, 10, B-12	1	23
Morton-B, 10, B-12	2	96
Wentz Oil Corp.:		
Morton, 10, B-12	1	70
Simms Oil Co.:		
Sealy, 50, F	1	27
Richardson et al:		
Stockton, 50, F	1	65
Total O'Brien Pool	6	281
Grand total Winkler County	606	91,230

PANHANDLE FIELDS

(Continued from Page 92)

Pendleton's No. 1 Walker was dry and abandoned at 731 feet.

Stephens County

Lone Star Gas Co.s No. 3 Brooks had top of Caddo lime at 3,350-75 feet and had flowed 130 bbls. per hour for six hours with 6,000,000 feet gas, total depth 3,375 feet. Now pinched to 40 bbls. per hour, estimated as 3,500-bbl. well. Lone Star Gas Co.s No. 1 McElvain had 50 bbls. oil, 140 bbls. water and 4,000,000 feet gas per day at total depth 3,511 feet. Lone Star Gas Co.'s No. 3 Calloway had 27,000,000 feet of gas at total depth 2,047 feet, top pay 2,023 feet.

Brown County

P. K. French and others' No. 1 Fry, dry and abandoned at 1,450 feet; Paramount Oil & Refining, Inc., and others' No. 1 Lowe, dry and abandoned at 1,240 feet. Waterman, No. 1 Looper, dry and abandoned at 694 feet.

TEXAS PANHANDLE DISTRICT

Carson County

Empire Gas & Fuel Co.'s No. 2 Deahl had 8,350,000 feet of gas at 2,612-2,785 feet and 2,935-3,011 feet. Total depth is 3,020 feet.

Gray County

The Texas Company's No. 20 Saunders was plugged back from total depth 2,870 feet to 2,854 feet and shot with 190 quarts from 2,645-2,835 feet. Top of pay was 2,658-63 feet and 2,755-60 feet with initial production first 24 hours 45 bbls.

Wheeler County

Burnett & Hashor's No. 1 Hashor was dry and abandoned at 1,960 feet, slight show gas at 1,937 feet. Edwards and others' No. 1 Cates had 26,000,000 feet of gas at total depth of 1,760 feet with top of pay 1,655 feet. Lela Oil & Gas Co.'s No. 7 Williams Laycock had initial production 30 bbls. oil with 6,000,000 feet gas. Total depth 2,217 feet and top pay is 2,208 feet. Murchison & Fain's No. 2-A Cooper was junked and abandoned at 1,455 feet. Murchison & Fain's No. 1-B Cooper had top of pay 1,465 feet, total depth 1,730 feet with initial production 51,000,000 feet gas. Wischkamper and others' No. 2 Curry had 50,000,000 feet gas at total depth 1,740 feet, top pay 1,673 feet.

WICHITA DISTRICT

Archer County

Dawson and others' No. 1 Kolb, dry

STEEL STORAGE REPORT OF WEST TEXAS AS OF MARCH 1, 1930

County—	Storage building	Present stock	Present room	Present capacity
Crane	.....	7,520,410	1,826,590	9,347,000
Crockett	.....	6,183	48,817	55,000
Ector	1—80,000	.....	.....	.....
Howard	.....	1,214,875	453,125	1,668,000
Midland	.....	10,402,328	947,672	11,350,000
Mitchell	.....	457,942	57,058	515,000
Pecos	.....	1,144,744	388,256	1,533,000
Reeves	.....	13,469	251,531	265,000
Reagan	.....	2,266,707	1,176,293	3,443,000
Val Verde	.....	1,700,000	300,000	2,000,000
Upton	.....	2,183,498	3,065,502	5,249,000
Ward	.....	3,391,369	2,940,631	6,332,000
Winkler	.....	8,461,274	4,279,726	12,741,000
Grand total	.....	38,762,799	15,735,201	54,498,000

and abandoned at 1,500 feet. W. C. Clark's No. 1 Lowe, dry and abandoned at 1,353 feet. Consolidated Oil Co. of Texas' No. 1 Harmel, total depth 1,450 feet, top pay 1,439 feet, initial production 63 bbls. Douglas Oil Co.'s No. 6 McClure, total depth 1,294 feet, top pay 1,291 feet, initial production 50 bbls. Hodges and others' No. 1 Logan, dry and abandoned at 1,305 feet. Lawson and others' No. 5 Richardson, total depth 1,417 feet, oil sand 1406 feet, initial production 60 bbls. Pandem Oil Corp.'s No. 3 Young, total depth 1,410 feet, oil sand 1,396 feet, initial production 140 bbls. Perkins & Cullum's No. 1 Richardson, total depth 1,384 feet, oil sand 1,381 feet, initial production 45 bbls. G. R. Ridgeway's No. 1 Jackson estate, dry and abandoned at 1,501 feet. The Texas Company's No. 1 Portwood, dry and abandoned at 1,489 feet.

Cook County

Lloyd Oil Corp.'s No. 3 Wheelock, total depth 1,333 feet, oil sand 1,329 feet, initial production 20 bbls. Same corporation's No. 4 Wheelock, total depth 1,318 feet, oil sand 1,309 feet, initial production 45 bbls. Same corporation's No. 5 Wheelock, total depth 1,318 feet, top pay 1,305 feet, initial production 35 bbls. Same corporation's No. 7 Wheelock, total depth 1,318 feet, oil sand 1,314 feet, initial production 22 bbls. Same corporation's No. 8 Wheelock, total depth 1,321 feet, oil sand 1,317 feet, initial production 40 bbls. Fain-McGaha Oil Corp.'s No. 1 Dillon, dry and abandoned at 1,745 feet. Republic Production Co.'s No. 1 Hickman was dry and abandoned at 2,644 feet.

Wichita County

Arkansas Fuel Oil Co.'s No. 25 Kemp & Kempner, total depth 1,766 feet, oil sand 1,747-66 feet, initial production 103 bbls. Same company's No. 40 Kemp & Kempner, total depth 1,785 feet, oil sand 1,763-71 feet, initial production 14 bbls. Hamilton & Sheldon's No. 1 Volkart, dry and abandoned at 2,603 feet. W. H. Hammon's No. 1 Fossett & Tuttle, dry and abandoned at 1,374 feet. W. H. Hammon's No. 10 Mitchell and others, total depth 1,318 feet, oil sand 1,297 feet and 1,318 feet, initial production 17 bbls. Kisk Oil Co.'s No. 2 Waggoner Brothers, dry and abandoned at 1,771 feet. George L. Pace and others' No. 1 Kidder was dry and abandoned at 2,006 feet. The Texas Company's No. 375 Waggoner, total depth 1,748 feet, oil sand 1,740 feet, initial production 19 bbls. United Producers Co.'s No. 11 Hodges, total depth 1,761 feet, oil sand 1,749-61 feet, initial production 42 bbls.

Jack County

L. G. Harper's No. 6 Ezell had initial production of 43 bbls. at a total depth of 3,155 feet, top pay is 3,137 feet. L. G. Harper's No. 7 Ezell location was abandoned. Kiser & Duffy's No. 1 Jones was dry and abandoned at 3,330 feet. Panhandle Refining Co.'s No. 5 Smith location was abandoned. Prairie Oil & Gas Co.'s No. 1 Munson had initial production of 150 bbls. at a total depth of 4,748 feet, top pay 4,691 feet.

Throckmorton County

C. & B. Oil Co.'s No. 1-A Leathers was dry and abandoned at 612 feet. C. & B. Oil Co.'s No. 2-A Leathers was dry and abandoned at 430 feet. C. & B. Oil Co.'s No. 3-A Leathers was dry and abandoned at 415 feet. C. & B. Oil Co.'s No. 1-B Leathers was dry and abandoned at 496 feet.

Baylor County

Alexander and others' No. 1 Mills was dry and abandoned at 1,551 feet.

Wilbarger County

Lido Oil Co.'s No. 3 Waggoner had initial production of 50 bbls. after being plugged back from 2,696 feet to 2,694 feet. Total depth 2,696 feet.

Young County

Bolin & Lindsey's No. 1 Perry was dry and abandoned at 2,845 feet. Shaw and others' No. 2 Jarnigan had 896 bbls. of oil and 1,000,000 feet of gas at a total depth of 2,544 feet, top pay 2,511 feet.

E. G. Christie's No. 1 Alsup was dry and abandoned at 1,229 feet. J. C. Cunningham's No. 1 Rogers was dry and abandoned at 1,000 feet. Madden & Hunt's No. 3 Deitrich, total depth 1,138 feet, top of pay 1,114 feet, and initial production 125 bbls. Amos Mitchell's No. 1 Dunnagan, total depth 942 feet, top pay 938 feet, and initial production 55 bbls. Panhandle Refining Co.'s No. 2 Taack was dry and abandoned at 803 feet. Perkins & Cullum's No. 7 Deitrich was dry and abandoned at 1,180 feet. Perkins & Junker's No. 1 Gragg was dry and abandoned at 925 feet. Petroleum Producers Co. and Madden's No. 3 Deitrich, total depth 1,135 feet, top pay 1,104 feet, initial production 102 bbls. E. R. Riggs' No. 6 Keeter was dry and abandoned at 950 feet. Riner & Omohundro's No. 1 Richardson was dry and abandoned at 752 feet. Simms Oil Co.'s No. 20 Dietrich was dry and abandoned at 1,184 feet. United Producers Co.'s No. 1 Bailey was dry and abandoned at 931 feet. Same company's No. 3 Leberman, total depth 885 feet, top pay 864 feet, and initial production 16 bbls. Williams and others' No. 2 Taack, total depth 658 feet, top of pay 655 feet, and initial production 47 bbls.

LIVELY DEBATE ON TARIFF AMENDMENT

(Continued from Page 55)

on oil, or language that had been so interpreted.

Mr. Franklin: "The administration pledged itself to this policy and it was broadcast by Senator Curtis."

Senator Blaine: "Everybody who wants a tariff claims that both political platforms uphold their contentions."

Mr. Franklin: "I take the attitude that this industry is entitled to protection to prevent monopoly of the oil industry by the three groups of big companies which have monopolized oil in the rest of the world."

Senator Blaine wanted to know how the witness classed the Skelly Oil Co.

Mr. Franklin: "Skelly is supposed to be independent."

Senator Blaine: "You indicate a doubt about that."

Mr. Franklin: "He sometimes appears to be allied with people who are not independent. Most of the executives of small companies, even though independent, appear to be afraid to expouse this cause. They are intimidated. They are in favor of a tariff but they will not come out in the open. They are afraid of the big boys and they are afraid they cannot go back to New York and borrow money."

Senator Blaine: "Who can you cite as an example of that?"

Mr. Franklin: "I cite Skelly. He says he is in favor of a tariff."

Senator Caraway: "I understand that among the larger groups competition in prices is not engaged in but they are strangling the independents. Now have you got some evidence that they are withdrawing credit? I would like to have that."

Requa Compact

Mr. Franklin: "I was introduced to the secretary of the Federal Conservation Board. He said it would have been a lot better for me in the future if I had not opposed the conservation plan. That statement was made in the presence of Paul Hedrick of the Tulsa World and he reported it."

Mr. Franklin said this remark was called forth when he criticized Mark Requa when he threatened the independents that if they did not agree to the plan for state compacts he would be in favor of bringing about coercion from the Government to compel them to do it.

Mr. Franklin: "I said, 'Now, Mr. Rochester, you are attempting to threaten me, to seal my mouth.' I said I would rather be a poor man all my life than to submit to that."

Senator Robinson, Indiana: "How could he bring about coercion? He has no connection with the Government at all."

Mr. Franklin said that when he criticized Mr. Requa he did not believe that the President would countenance such things and he said that.

Senator Walsh: "You do speak of The Texas Company as one of the big companies."

Mr. Franklin: "I do not speak of them as one of those that are trying to grind the independent producers."

Senator Walsh: "They are not active in the tariff matter."

Mr. Franklin: "No, I would have known it if they were."

Mr. Franklin testified that he talked with Claudius H. Huston, chairman of the Republican National Committee, and added: "He didn't say anything. He just listened," and a telegram sent to the oil representative by Representative Garner, Democrat of Texas, said it was believed that both Texas senators would vote for the proposed oil tariff.

Senator Blaine read numerous telegrams, some of which Mr. Franklin said had never come to his attention, advocating that people at home should telegraph their senators. They wanted to "keep the home fires burning," that is, show that people at home wanted this tariff. One telegram from the Farmers Union in Texas was addressed to an organization in Wisconsin and Mr. Blaine wanted to know whether there was any oil in Wisconsin. He resented the idea of having farmers use this sort of influence to get a tariff on oil and that appeared to him to be a kind of propaganda without any justification. Mr. Blaine frequently insisted that answers be given in the affirmative or negative but the witness at these suggestions for the first time showed irritation and declared that he would not answer questions that way when they would not convey his proper answer.

"Your bluster will not get anything out of us," declared Senator Blaine. He added that the petroleum organization had sent out thousands of telegrams.

Not until long after the Senate had assembled did the committee adjourn.

Speeches in Senate

Oil delegates then went to the Senate chamber to hear Senator Thomas deliver a long speech in favor of a tariff on oil. As is customary, not more than a dozen senators were in their seats and there were comparatively few people in the galleries. Senator Smoot moved in and out and Vice President Curtis was on the floor, having surrendered the chair of the presiding officer temporarily to Senator Fess. Senator Borah took a seat near Senator Thomas and was an attentive listener. Several hours were consumed in a debate that attracted comparatively little attention but which gave an opportunity to senators from the principal oil states to add their approval to the demand for a tariff on petroleum. Senator Sheppard of Texas, who did not come to support the amendment until late in this oil campaign, added his voice to the senators insisting on a tariff.

While Senator Blaine was denouncing the methods of the oil producers to obtain a tariff as "nefarious and damnable" an unprecedented scene was enacted. Senator Norris arose and remarked that Mr. Franklin was in that part of the Senate reserved for guests of senators.

"Even now when the senator is speaking," said Senator Norris, "Franklin is somewhat amused at the remarks the senator is making about him."

Senator Blaine resumed his speech and, looking up at Franklin, shouted: "The smile is beginning to come off, notice."

Mr. Franklin soon left the gallery but later returned.

Senator Broussard declared that in referring to trades for lumber and sugar by the oil men Senator Blaine reflected on senators. He insisted that he should read the letter he stated reflected on Senator Dale of Vermont and only after Senator Dale urged him did he comply. It was from Charles Fling and stated the Oklahoma senators were in especially good position to trade. Senator Dale previously denied this lobby committee testimony and said he did not know who Mr. Franklin was until this lobby committee testimony had arisen and declared that no one had approached him on behalf of a duty on oil.

Finally Senator Thomas took full responsibility for Mr. Franklin's presence in Washington. "I sent word to Franklin," he said, "that the only chance he had to get relief was to bring men to Washington who knew the business and not to send high-pressure lobbyists." He added that the men who came represented the best men in Oklahoma, Kansas, Texas and Colorado. "They came at my invitation and I take full responsibility," he added.

Criticism of the oil men was confined to the testimony taken earlier in the day by the lobby committee and except for the assault by Senator Blaine late in the evening the Senate debate was in the form of a discussion of claims made by Mr. Franklin and widely distributed since his arrival here.

How Senate Voted

Finally when the vote was taken Mr. Caraway of Arkansas, who had appeared to be a critic of the campaign carried on by Mr. Franklin, gave his vote in favor of the amendment. Of the 27 senators voting for the tariff, seven had no oil in their states and with the exception of Senator Jones of Washington, none had either lumber or sugar interests except in cases in which they came from oil states.

Of the 39 senators voting against an oil tariff only two were from states that contained oil in appreciable quantities, Barkley of Kentucky and Walsh of Montana. Of the 27 senators voting in favor of a tariff, 7 were Democrats and 20 were Republicans.

In the Senate during the debate Senator Blaine, referring extensively to telegrams and letters from the files of the headquarters at the Mayflower, was extravagant in denouncing the campaign carried on by Mr. Franklin as an attempt to rush Congress by exciting home influences of senators and by forming a coalition with the lumber and sugar interests.

After the vote was taken Mr. Franklin stated he would continue the work of educating the American public to the necessity of a tariff on oil. He will soon return to Oklahoma but intends to keep his organization intact.

The vote for and against an oil tariff follows:

Yeas—27. Allen, Republican, Kansas; Baird, Republican, New Jersey; Bratton, Democrat, New Mexico; Broussard, Democrat, Louisiana; Capper, Republican, Kansas; Caraway, Democrat, Arkansas; Connally, Democrat, Texas; Cutting, Republican, New Mexico; Fess, Republican, Ohio; Goff, Republican, West Virginia; Goldsborough, Republican, Maryland; Grundy, Republican, Pennsylvania; Hastings, Republican, Delaware; Hatfield, Republican, West Virginia; Johnson, Republican, California; Jones, Republican, Washington; Kean, Republican, New Jersey, Patterson, Republican, Missouri; Pine, Republican, Oklahoma; Ransdell, Democrat, Louisiana; Robison, Republican, Kentucky; Sheppard, Democrat, Texas; Shortridge, Republican, California; Steiwer, Republican, Oregon; Thomas, Democrat, Oklahoma; Waterman, Republican, Colorado, and Watson, Republican, Indiana.

Nays—39. Ashurst, Democrat, Arizona; Barkley, Democrat, Kentucky; Black, Democrat, Alabama; Blaine, Republican, Wisconsin; Borah, Republican, Idaho; Brock, Democrat, Tennessee; Copeland, Democrat, New York; Dale, Republican, Vermont; Dill, Democrat, Washington; Fletcher, Democrat, Florida; Frazier, Republican, North Dakota; George, Democrat, Georgia; Hale, Republican, Maine; Harris, Democrat, Georgia; Harrison, Democrat, Mississippi; Hawes, Democrat, Missouri; Hayden, Democrat, Arizona; Heflin, Democrat, Alabama; Keyes, Republican, New Hampshire; La Follette, Republican, Wisconsin; McKellar, Democrat, Tennessee; McMaster, Republican, South Dakota; Metcalf, Republican, Rhode Island; Norbeck, Republican, South Dakota; Norris, Republican, Nebraska; Nye, Republican, North Dakota; Pittman, Democrat, Nevada; Robinson, Republican, Indiana; Schall, Republican, Minnesota; Smith, Democrat, South Carolina; Smoot, Republican, Utah; Steck,

H. T. P.

Heat Exchangers of Stainless Steel

HEAT TRANSFER PRODUCTS, Inc., has achieved a position of outstanding prominence in the manufacture of Heat Exchangers of Stainless Steel.

Further, to the best of our knowledge, HEAT TRANSFER PRODUCTS, Inc., is the only organization that has built heat exchangers in large commercial sizes of Chrome Iron throughout.

Many of the leading refiners are now turning to this chrome iron as the solution of their corrosion difficulties.

If corrosion in your heat exchangers is a cause of trouble and expense to you, consult H. T. P. engineers. Our broad experience in this branch of the exchanger field is at your disposal.

With the vast manufacturing facilities which its affiliation with the American Locomotive Company assures, HEAT TRANSFER PRODUCTS, Inc., is in a position to supply Stainless Steel Heat Exchangers to any specifications.

HEAT TRANSFER PRODUCTS, INC.
30 CHURCH STREET » » NEW YORK

Affiliated with and Products Manufactured by
AMERICAN LOCOMOTIVE COMPANY

Petroleum Division District Offices:
2015 MAGNOLIA BLDG., DALLAS, TEXAS
502 NATIONAL BANK OF COMMERCE BLDG., TULSA, OKLAHOMA
1022 PACIFIC NATIONAL BANK BLDG., LOS ANGELES, CAL.

Democrat, Iowa; Stephens, Democrat, Mississippi; Swanson, Democrat, Virginia; Trammell, Democrat, Florida; Vendenberg, Republican, Michigan; Walcott, Republican, Connecticut; Walsh, Democrat, Massachusetts; Walsh, Democrat, Montana.

Second Hearing

WASHINGTON, D. C., Mar. 4.—There was a decided change in the manner of Mr. Franklin's questioning by Senator Blaine at today's hearing by the Senate Lobby Committee, bruskness giving place to courtesy. Senator Thomas, of Oklahoma, not a member of the lobby committee, arrived early and sat with the committee. At the close of the hearing he said he wished to apologize for having said on the floor of the Senate that the lobby committee treated Mr. Franklin discourteously. He had referred to Senator Blaine, a member of that committee, alone.

Senator Thomas announced that he would have another amendment in modified form to introduce for the tariff on oil.

When Mr. Franklin again went on the stand a large pile of telegrams from his files were placed before him for identification and questions led him to say independent oil men were afraid to come out in favor of a tariff because of the danger of having their credit cut off in New York.

Mr. Franklin offered a statement he desired to place in the record of the lobby committee but Senator Blaine objected to its reading and the chairman decided it could not be received for printing unless passed upon by the committee as to its relevancy. This Mr. Franklin declined to do unless assured in advance that it would be accepted. Finally Senator Thomas stated he would read the statement in the Senate. It is understood to be a reply to Senator Blaine's criticism of the oil delegates.

SENATE ASKS INQUIRY ON MONTANA PRICES

WASHINGTON, D. C., Mar. 3.—The Attorney General of the United States is requested to make an investigation of the corporations and associations engaged in the business of selling oil and gasoline in the State of Montana for the purpose of determining whether any such corporations or associations are fixing prices or engaged in other practices in violation of the federal antitrust laws, by a senate resolution introduced by Senator Wheeler, Democrat, of Montana, which was passed unanimously by the Senate.

UNIT OPERATION IN EAST AND ABROAD

(Continued from Page 54)

corporated in which the Polish government and the leading oil companies are participants. This company, known as the "Pioneer" will either engage in the exploration and exploitation of bituminous minerals, including petroleum, or will support the work of others through financial participation.

Russia—All the fields in Russia are operated by a single agency, the Soviet government. Under the new plan of development each sand is developed separately by drilling rows of wells around the entire pool and drilling new rows toward the center of the field as the edge wells become exhausted. The production of the different fields of Russia, for the year 1928, was approximately as follows:

	Bbls.
Baku	57,655,000
Grozny	27,138,000
Emba	1,666,000
Turkestan, Kuban, Black Sea area	1,018,000
Total	87,487,000
Daily average (approx.)	240,000

Asia

Persia—The oil fields of Persia furnish an excellent example of the advantages of unit operation. The fields are all operated by a single company and because of unit control it has been possible to limit the number of wells to the minimum required for draining the area, to produce the wells in the most efficient manner, and to restrict production to the market demands. The production of the Persian fields of which the Maidani-Naftun is the most important area amounted to approximately 40,000,000 bbls. in 1928 or about 110,000 bbls. daily and this represents only a portion of the potential production.

Iraq—Although important discoveries of oil have been made in Iraq there is no outlet for the production at present. The field of I.P.C. will be operated on the unit plan as at present there is only one operating company consisting of British, French, Dutch and American interests.

India—In the Assam and Punjab districts the several individual pools are each owned entirely by one company. The production from the Assam district in 1928 amounted to approximately 900,000 bbls. while the Punjab district produced approximately 350,000 bbls.

In the old Yenangyaung Field in Burma there are a number of hand-dug wells that are still operated by the landowners. Most of the newer part of the field is operated by a single company as is also a large part of the Singu Field. The production of the fields in Burma amounted to approximately 7,490,000 bbls. in 1928.

Dutch East Indies

The several fields in Borneo, Java, Ceram and North Sumatra are all operated by a single company. The fields in Sarawak are also operated on a unit basis. In South Sumatra there are two companies in the Palembang district, one being a subsidiary of an American company, but these two companies are operating in different fields. All the oil produced in the Dutch East Indies can be considered as coming from fields operated as units. The production of the Dutch East Indies in 1928 amounted to 34,550,000 bbls. (approximately 94,700 bbls daily) which was divided as follows:

	Bbls.
Borneo	18,720,000
Sarawak	5,379,000
Java	3,493,000
Ceram	276,000
Sumatra	6,682,000

Japan—The production of Japan, which amounted to 1,773,000 bbls. in 1928, is practically all obtained from properties operated by one company.

Saghalien—The operations of the Island of Saghalien are conducted by a Japanese company and by the Soviet government. Although the area has been divided between the two interests, the operations are on different parts of the island and are noncompetitive. The production of Saghalien in 1928 amounted to approximately 500,000 bbls.

Africa

The total production of Africa amounted to only 1,811,000 bbls. in 1928 of which approximately 1,800,000 was produced in Egypt and 11,000 bbls. in Algeria. The entire production of Egypt was produced by a single company. There are no producing fields in Africa, south of the equator, but several wells have been drilled. In case oil is discovered, the fields will no doubt be operated as units as large concessions have been granted to the different companies.

Summary

The outstanding unit or single operations outside of the United States are: The Tonala and Filisola Fields in Mexico, the Mene Grande and El Mene Fields in Venezuela, the Infantas and La Cira Fields in Colombia, the fields in Peru, the Russian fields operated by the Soviet government, the fields in Persia and the several fields in Dutch East Indies. These fields, together with the smaller ones mentioned, accounted for a production of about 231,400,000 bbls. in 1928 which was approximately 55 per cent of the total of 420,896,000 bbls. which was produced outside of the United States during the year. The complete figures for 1929 are not available but the percentage of the total produced by unit pools are doubtless somewhat higher. There are other unit fields which are not important from the standpoint of the present world market for petroleum, but some of these will no doubt become of considerable importance. It should be borne in mind that since the production from fields operated as units in many cases is restricted to market demands, the present production of these fields represents only a small percentage of the amount that could be produced if the fields were completely drilled and the wells were operated at full capacity.

In many of the foreign fields, competion on drilling and producing operations is just as keen as in the United States and the methods followed in developing and operating the properties are not essentially different from those employed in our highly competitive fields. It is somewhat significant, however, that with the exception of the Lake fields in Venezuela, practically all of the newer producing fields in foreign countries, and those that give promise of being extremely important in the future, are operated as units by single companies.

DEVELOPMENT OF FOREIGN REFINERIES

(Continued from Page 58)

coal needed for the running of the refinery. The piers of the company are 656 feet in length, they are well equipped and connected by two railway lines.

The pipe lines which carry the raw petroleum to the factory, which is about five-eighths of a mile from the receiving docks, start from these piers. The flowback station which is near the quay sends the petroleum to a supply station from whence it is pumped into six large reservoirs or tanks each having a capacity of 1,717,154 gallons. The total represents an amount of 10,302,930 gallons, or approximately 30,000 tons.

Two small tanks are situated near the distillation plant and are filled by the supply station pumps. Both of these tanks contain the amount of raw petroleum which is to be refined in one day and are replenished daily. They are automatically filled and the current supply for the refinery is always at hand.

After the first distillation is made in a special building the topped crude which at that time has supplied the gasoline, gas oil and kerosene, is again subjected to a second distillation for the withdrawing of spindle oil, motor oil, cylinder oil and refined petroleum. The oils are redistilled before being sold to the trade. This refinery is also equipped to manufacture special petroleum by-products such as asphaltum products and petroleum bitumen.

Besides the distillation, redistillation and refinery buildings and the supply station referred to, the company at Petit-Couronne also maintains an oil stocking mill and a cask manufacturing mill.

In One Year's Time

In one year's time large buildings, several large tanks or reservoirs, railway lines, an automobile road of three-fourths of a mile, improved landing stations, residences for the directors of the establishment and homes for the laborers have been built. The principal output of the refinery at Petit-Couronne will be lubricating oils.

The first oil tanker to be discharged at Petit-Couronne for the Societe Maritime des Petroles was the Glarona which arrived there on February 13, 1929. The dimensions of the tanker are as follows: 500 feet long, 64 feet wide, tonnage 13,500 gross tons. The Glarona is the largest oil tanker which ever entered the port of Rouen; its dimensions and tonnage are slightly above those of the Brunswick which had been the largest tanker to enter Rouen.

The activities of the new refinery are expected to be very extensive. It is stated that approximately 200,000 tons of raw petroleum will be refined in this factory yearly but this output will be doubled when the installations now being planned will permit the refining of 1,200 tons daily instead of 600 tons that are being refined at the present time.

The program for port and harbor expansion at Dunkirk has recently been extended to include the erection of an important plant for the production of hydrocarbons. Arrangements have just been completed whereby the Raffinerie de Petrole du Nord, with the collaboration of the Dunkirk Chamber of Commerce, is authorized to establish the new hydrocarbon plant at the western end of the existing harbor.

The creation of this new installation is a direct result of new French regulations affecting the importation of refined petroleum products. The port of Dunkirk has long been an important point of entry for the importation of hydrocarbons into France. In view of the new regulations, the Raffinerie de Petrole du Nord finds it to its advantage to produce hydrocarbons in its own plant at Dunkirk rather than to import the finished product.

The proposed plant will have an initial consumptive capacity of 350,000 tons of petroleum, to be increased to 500,000 in the near future. Storage facilities will be provided for up to 125,000 tons of petroleum and 200,000 tons of the refined products.

"STUDY SITUATION," SAYS FITZPATRICK

(Continued from Page 55)

appear as though it were a lineup of a few independents—so called—against the Standard Oil Co. I think it is more than that. It is generally understood to be a fact that the State of Texas owns more royalty oil being produced today than any other royalty owner in the world. A cut in the price of 25 or 30 cents per barrel on the oil that is produced for the State of Texas should, and probably does, give the people of that State some concern. Also, in the State of Oklahoma, that commonwealth derives a very substantial part of the revenue supporting the State Government from a tax on oil production. The tax in that State is 3 per cent of the gross value of all oil and gas produced in the State. Oklahoma has been in the habit of producing between 600,000 and 700,000 bbls. of oil per day, an amount less than has been run to stills in the last two years of Oklahoma crude oil. The recent reduction in price on the grade of oil produced in Oklahoma, amounts to approximately 30 cents per barrel. This effects a reduction in the revenues of the State of approximately $6,000 per day. I have seen recent figures published in the newspapers of Oklahoma, which I regard as quite as reliable as any figures that have been published in this controversy, which show that if the price level for crude oil in Oklahoma continues throughout the year of 1930 as at present, there will result a deficit of $3,500,000 in the revenues to the State of Oklahoma. Who can say that all the people of Oklahoma are not interested in this controversy?

Competition With Coal

By the light of the "Lamp," a Standard Oil publication, we learn that soft coal cannot compete with low-priced oil as fuel. Then, does it not follow that he who cuts the price of oil low, contributes to the closing down of the coal mines in various localities throughout the United States? That this closing down throws thousands of honest government-supporting citizens out of employment which in turn destroys the prosperity of the local community. Are not these people interested?

Should not all these people whose interests are affected, council together to learn what it is all about and find out what their rights are and find means for the protection of those rights? If such co-operation be in violation of law, then the law should be changed.

Someone may say that such arguments lead inevitably to government control. I don't think so, but if it did, who would not prefer recognizing honest public officials as arbitrators of their conduct and corporate operation than continue at the mercy of two or more large world-wide units who unfortunately become involved in a quarrel over gallonage?

FOUR DRY HOLES IN VAN ZANDT TO NORTHWEST OF THE VAN POOL

By L. E. Bredberg
Fort Worth Bureau, The Oil and Gas Journal

FORT WORTH, Tex., Mar. 3.—Van Zandt County registered its first crop of dry holes this week when four wildcats within a small area northwest of the Van Pool were abandoned. The Central Oil Co.'s No. 1 West was one of the wells abandoned, having no shows of oil or gas. Total depth is 3,535 feet. R. C. McElmurry's No. 1 Peel, 160 feet from the east and 460 feet from the north line of the S. T. Meeks Survey, 8 miles southeast of Canton, was also abandoned with no shows of oil. Total depth was 3,008 feet in chalk. T. G. Shaw's No. 1 Huddle, a short distance southwest of the Van Pool in the Richardson Survey, was abandoned at 3,448 feet. Thornton & Taubert's No. 1 Everett in the Carlyle Survey, 4½ miles southeast of Canton was also abandoned in chalk, with no shows. Total depth was 3,008 feet.

Pure Oil Co.'s No. 1 Crim, 250 feet from the south line and 690 feet from the east line of the Crim 57-acre tract, 2,500 feet northwest of the discovery well in the Van Pool, is not looking much better than it did in last week's reports. Present total depth is 3,037 feet. Seven-inch casing is being set at 2,880 feet, top of the Woodbine sand. Slightly saturated cores have been encountered from 3,002-37 feet. As this test is running far lower than any other well in the field, and it is on the western side, it is being closely watched for developments.

The Van Pool reached a peak of over 10,000 bbls. this week when it produced 10,325 bbls. on March 2 from the 10 producing wells. Production from the 10 wells follows for March 3:

	Bbls.
Pure's No. 1 Marman, two 1-inch chokes	585
Pure's No. 1 Thompson, one-half-inch	1,350
Pure's No. 1 Wells, three-fourths-inch	973
Pure's No. 1 Magers, two 1-inch	490
Pure-Shell's No. 1 Tunnell, one-half-inch	1,472
Pure-Shell's No. 2 Tunnell, one-half-inch	1,388
Pure-Shell's No. 1 Fowler, one-half-inch	1,293
Pure-Texas Co.'s No. 1 Tunnell, 1-inch	285
Pure-Texas Co.'s No. 1 White, one-half-inch	1,160
Pure-Sun's No. 1 Thompson, one-half-inch	1,355
Total	10,351

New Locations

Two more locations were made in the Van Pool this week. Pure Oil Co.'s No. 1 V. T. Davis, 250 feet from the west and 1,061 feet from the south line of a 139.8-acre tract in the Nacogdoches County School Lands 1 mile north of the discovery and Pure-Humble Oil & Refining Co.'s No. 1 L. V. Freeman, 250 feet from the east and 712 feet from the north line of a 31.5-acre tract in the John Walling Survey, one-half mile due east of the discovery well.

Cranfill & Reynolds' No. 1 Coker, 160 feet from the south and west lines of Coker's 85.5-acre tract in the William Daniel Survey, approximately 2½ miles northeast of the Van Pool discovery, is moving in a derrick for one of the most important tests in the area, testing the acreage to the northeast of Pure's No. 1 Magers which ran exceedingly low on the structure, but made a small producer.

Another location for Van Zandt County was made by the Texas Chief Oil Co. on the Foster farm, 6 miles south of the town of Canton. This is a wildcat location. Daniels and others made a location on the Fannie Cumbine farm in the John Wright Survey. It is another wildcat location.

Dennis Oil Co.'s No. 1 Swain, in the John Walling Survey, is drilling sandy shale at 1,115 feet. Hart Oil Co.'s No. 1 Swain in the John Walling Survey is still a location.

W. B. Powell's No. 1 Bailey, in the F. Bailey 51-acre tract, 6 miles southwest of Van, is drilling sandy shale at 1,615 feet.

Sprinkler and others' No. 1 Andrew, in the Margaret Neal Survey, southwest of Canton, has a derrick up.

In Smith County the East Texas Oil Development Co.'s No. 1 Kadane in the John McFadden Survey, is drilling shale at 2,115 feet. R. H. Davis' No. 1 Starnes, 3½ miles northeast of Starville in the same county, is shut down at 1,155 feet losing returns.

Deep Rock Oil Co.'s (Foster and others) No. 1 Bowdoin in the M. Lout Survey, in the Lindale district, is shut down at 2,950 feet after coring black shale with red streaks.

Sutton and others' No. 1 Hammon in the Jamestown district, Smith County, has spudded and shut down.

Drilling Wells

Drilling wells in the Van Pool, Van Zandt County, follow:

Pure Oil Co.'s No. 2 Jarman, 1,363 feet from the south and 313 feet from the east of the Jarman 132.8-acre tract north of the discovery, is drilling at 155 feet in sand and shale.

Pure-Shell Petroleum Corp.'s No. 1 Fowler, 268 feet from the north and 122 feet from the west of Fowler's 3-acre tract, southeast of the discovery, is rigging up.

Pure Oil Co.'s No. 1 D. R. Howell, 570 feet south of north line and 440 feet west of east line of Howell's 59.2-acre tract, H. V. Moore Survey, southwest of pool, is drilling at 2,355 feet in chalk.

The Texas Company's No. 1 R. V. White, 665 feet north of south line and 250 feet east of west line of White's 33.7-acre tract in Nacogdoches, CSL, east of Pure's No. 1 Magers, is drilling at 2,400 feet in shale.

Pure Oil Co.'s No. 1 Clark, 645 feet south of north line and 105 feet west of east line of Clark's 63.3-acre tract, John Walling Survey, west offset to Texas' No. 1 Tunnell, is drilling at 2,049 feet in shale. Same company's No. 1 Tunnell, 250 feet south of north line, 200 feet east of west line of Tunnell's 97.8-acre tract, John Walling Survey, east of Shell's No. 1 Fowler, is drilling at 860 feet in shale. Same company's No. 2 Thompson, 525 feet south of north line and 270 feet east of west line of J. T. Thompson's 49.4-acre tract, Mund Gross Survey, east offset to Pure's No. 1 Wells, is drilling at 1,078 feet in shale and shells.

The Texas Company's No. 1 Tunnell, 645 feet south of north line and 105 feet east of west line of R. A. Tunnell's 101.7-acre tract, John Walling Survey, east offset to The Texas Company's No. 1 Tunnell-A, is drilling at 795 feet in shale.

Shell Petroleum Corp.'s No. 3 Tunnell, 250 feet north of south line and 200 feet west of east line of Tunnell's 21.7-acre lease, John Walling Survey, north offset to Shell's No. 1 Fowler, is drilling at 1,660 feet in shale.

South of Mineola

As mentioned last week, a block taken south of Mineola in southern Wood County, seemed to be one of the most interesting and "hottest" areas of East Central Texas. The West Texas Royalty Co. has made a location for its No. 1 Negro Orphanage on an 80-acre tract in this area and will put down the test at once.

East Central Texas continues leading in activities in Texas, and more district offices are being opened at Tyler almost every week. One of the last reported companies to move offices there is the Sinclair Oil & Gas Co. R. O. Lowrance, land man for the company, will be in charge of the office with Don Reese as geologist and scout. Lowrance has formerly been working out of the Fort Worth office, covering the whole state, and Reese has been doing surface geology in the West Texas district, with headquarters at San Angelo.

One of the most talked about tests in this district has been W. H. Roeser, Inc.'s No. 1 Moody near Blackfoot in Anderson County. The last report gives it as drilling below 4,282 feet in shale. A few days more drilling should complete the story of this well if there are no accidents.

Cranfill & Reynolds' Tennessee Colony block in Anderson County is another interesting area. Many companies and individuals have been leasing nearby acreage, and purchasing royalty in and around the block. It is reported a test will be drilled on a 2,500-acre block recently taken by the Louisiana Oil & Refining Co., just south of Cranfill & Reynolds' block.

Production

Daily average production of the pools in this area during the past week follows:

EAST CENTRAL TEXAS

Boggy Creek	3,400
Cedar Creek	50
Currie	371
Hill County	45
Mexia	4,244
Minerva	500
Nigger Creek	205
Powell	6,085
Richland	255
Thrall	546
Van	9,215
Wortham	870
Total East Central Texas	25,786
Week ended February 22	25,226
Increase	560

BIDS ON ROYALTY OIL

WASHINGTON, D. C., Mar. 3.—Bids opened in the office of the Secretary of the Interior for the sale of royalty oil accruing to the United States from two wells on certain oil and gas leases on government land in the Kettleman Hills oil field in California were as follows: The Texas Company bid 70 cents per barrel above the posted field price in the Sunset-Midway Field. The Midoil Refining Co. of Fellows, Calif., W. G. Phillips, owner, bid $2.57 per barrel. F. N. Rumbley of Los Angeles bid $2.50 per barrel. The Associated Oil Co. of San Francisco bid $1.65 per barrel.

WILDCAT OPERATIONS IN WEST TEXAS

(Continued from Page 91)

CONCHO COUNTY

Cranfill et al's No. 1 Tubb, 2,310 ft. from N and 330 ft. from E of Sec. 8, Blk. B-27, Public School Land .... Location.
Duffy et al's No. 1 Cowden et al, 660 ft. from S and W lines of Sec. 18, Blk. X, C.C.S.D.&R.G.N.G. Sur. ..... Location.
Duffy et al's No. 1 Callan, 1,520 ft. N and 1,120 ft. W of SE cor., Sec. 21, Blk. 10, H.&T.C.R.R. Sur. ..... Spudded and shut down.
Humble Oil & Ref. Co.'s No. 2-C University, 2,310 ft. N and 330 ft. W of SE cor. Sec. 40, Blk. 30, University Land ..... Location.
Turner et al's No. 1 Borsig, 150 ft. from S of SE cor., G. Emmig Sur. 130, 6 mi. W of Paint Rock ..... Shut down 735 ft.

CRANE COUNTY

Simms and Atlantic's No. 1 University, 2,310 ft. from N, 990 ft. E. Sec. 39, Blk. 30, University Land ..... Top salt 1,070 ft.; drlg. 2,875 ft.
Warner-Quinlan Co.'s No. 8 University, 990 ft. S and 330 ft. W of NE cor. of SW, Sec. 39, Blk. 30, University Land ..... Drlg. 1,810 ft.

CROCKETT COUNTY

Empire Gas & Fuel Co.'s No. 1 Shannon, 330 ft. N and E of Sec. 42, T.C.R.R. Sur. ..... Top salt 1,130 ft.; top lime 2,468 ft.; top pay 2,615 ft.; total depth 2,660 ft.; 1 bbl. oil per hour; shot 50 qts. from 2,615-30 ft.; to put on pump.
Lewis & Daniels' No. 1 Pecos River bed, 19 yds. S and 37° E of NW cor., Sec. 33, Blk. 1, I.&G.N. Sur. ..... Shut down 1,407 ft.
Magnolia Pet. Co.'s No. 1 Hoover, 2,310 ft. from N and 330 ft. from E of Sec. 12, Blk. 1, G.C.&S.F.R.R. Sur.. Top salt 660 ft.; drlg. 1,260 ft.

CULBERSON COUNTY

Grisham & Hunter Oil Corp.'s No. 1 Seay, 330 ft. from S and W of Sec. 16, Blk. 59, Twp. 7, T.&P.R.R. Sur. ... Total depth 2,995 ft.; top Delaware 2,934 ft.; 5,000,000 ft. gas at 2,995 ft.; cleaning up wreckage after fire.
Hickey & Stiver's No. 1 C. O. Finley, 600 ft. N and 1,980 ft. W, Sec. 20, Blk. 82 ..... Small show oil 1,331 ft.; shut down 2,275 ft.; hole full water; elev. 3,874 ft.
Kornrumpf et al's No. 1 Garren, 330 ft. S and W Sec. 15, Blk. 79, Public School Land ..... Rigging up.
West Coast Oil & Exploration Co.'s No. 1 McGregor, C NW, Sec. 14, Blk. 81 ..... Slight show oil 740 ft.; shut down 875 ft.; may abandon.
Scott & Dittman's No. 1 Miller, 1,160 ft. N and 2,480 ft. E, Sec. 1, Blk. 97, Public School Land ..... Rainbow 1,056 ft.; 300 ft. sulphur water 1,725 ft.; oil show 2,528 ft.; hole full sulphur water; running 6-in. casing; shut down 3,508 ft.

ECTOR COUNTY

Cosden Oil Co.'s No. 1 Kloh & Rumsey, 990 ft. S and 330 ft. E NW cor. Sec. 17, Blk. 44, Twp. 3s, T.&P. Sur. ..... Building rig.
Cosden Oil Co.'s No. 2 University-B, 2,310 ft. S and 440 ft. W of NE cor. of Sec. 2, Blk. 35, University Land ..... Spudding 135 ft.
C. P. Davis et al's No. 1 Hendricks, C SW Sec. 46, Blk. 42, Twp. 2s, T.&P.R.R. Sur. ..... Drlg. 630 ft.
Gibson & Johnson's No. 1 Scharbauer, 990 ft. from N and E of Sec. 4, Blk. B-15, Public School Land .... Location.
Gulf Prod. Co.'s No. 1 State, 330 ft. N and 440 ft. W of SE cor. of S 160 ac. of Sec. 1, Blk. 35, University Land ..... Drlg. 300 ft.
Gulf Prod. Co.'s No. 1 State-A, 330 ft. S, 440 ft. W of NE cor. of N half of S half Sec. 2, Blk. 35, University Land ..... Drlg. 640 ft.
Humble Oil & Ref. Co.'s No. 2 Kloh-Rumsey-D, 2,310 ft. S and 440 ft. E of NW cor. of Sec. 7, Blk. 44, Twp. 3s, T.&P. Sur. ..... Drlg. 975 ft.
Humble et al's No. 3 Kloh-D, 2,325 ft. N and 440 ft. E of SW cor. Sec. 7, Blk. 44, Twp. 3s ..... Rigging up.
Humble et al's No. 4 Kloh-D, 322 ft. N and 440 ft. E of SW cor. Sec. 7, Blk. 44, Twp. 3s ..... Rigging up.
Humble Oil & Ref. Co.'s No. 2 York, 990 ft. S and 440 ft. E of NW cor. of Sec. 16, Blk. 44, Twp. 3s, T.&P. Sur. ..... Drlg. 1,910 ft.
Humble Oil & Ref. Co.'s No. 3 York, 1,650 ft. S and 440 ft. E of NW cor. Sec. 16, Blk. 44, Twp. 3s, T.&P. Sur... Drlg. 1,195 ft.
Humble et al's No. 4 York, 323 ft. S and 440 ft. E of NW cor. Sec. 16, Blk. 44, Twp. 3s ..... Rigging up.
Humble et al's No. 5 York, 2,334 ft. S and 440 ft. E of NW cor. Sec. 16, Blk. 44, Twp. 3s ..... Rigging up.
Humble et al's No. 6 York, 2,991 ft. S and 440 ft. E of NW cor. Sec. 16, Blk. 44, Twp. 3s ..... Rigging up.
H. F. Wurtz' No. 1 E. A. Ibbetson et al, 330 ft. from N and E lines of NW, Sec. 16, Blk. 46, Twp. 3s, G.M.M.Br.&A. Sur. ..... Spudded and shut down.
Landreth Prod. Corp.'s No. 1-A University, NE Sec. 3, Blk. 35, 110 ft. E of No. 1-T ..... Spudding.
Landreth Prod. Corp.'s No. 1 University-R, 2,310 ft. N, 440 ft. W SE cor. Sec. 1, Blk. 35, University Land.... Rig.
Landreth Prod. Corp.'s No. 2 University-S, 330 ft. S and 440 ft. W of NE cor. Sec. 2, Blk. 35, University Land ..... Rigging up.
Landreth Prod. Corp.'s No. 2-T University, 990 ft. from N and 330 ft. from E of Sec. 3, Blk. 35 ..... Drlg. 2,555 ft.

Llano Oil Co.'s No. 1 Midland, 330 ft. N and W of Sec. 18, Blk. 44, Twp. 3s, T.&P.R.R. Sur. ... Drlg. 3,585 ft.
T. P. Coal & Oil Co.'s No. 1 McKenzie, 1,650 ft. from S and 330 ft. from E of Sec. 28, Blk. 45, Twp. 2s, T.&P. Sur. ... Location.
R. R. Penn et al's No. 1 Goodman et al, 2,640 ft. N and 330 ft. W of SE cor. Sec. 27, Blk. 44, T.&P.R.R. Sur... Location.
Skelly Oil Co. et al's No. 1 University-A, 990 ft. S and 440 ft. N of NE cor. Sec. 1, Blk. 35, University ... Location.
Wurtz' No. 1 Obleetson et al, 330 ft. from N and 2,310 ft. from W, Sec. 16, Blk. 46, Twp. 3s, T.&P. Sur. ... Location.

EL PASO COUNTY

Laytex's No. 1 Malone, 2,200 ft. SW and NW, Sec. 46, J. M. Day Sur. ... Shut down 1,481 ft.

EDWARDS COUNTY

A. M. Griffith's No. 1 Wardlow, Sec. 60, V-8, J. C. Clift Sur. ... Shut down 3,000 ft.

FISHER COUNTY

Cranfill & Reynolds' No. 1 Johnson, 440 ft. from N and 1,540 ft. from W of Sec. 3, Blk. R, Richardson Sur... Shut down 1,360 ft.
Magnolia Pet. Co.'s No. 1 Lee, Sec. 357, 2,310 ft. from N and 4,286 ft. from W ... Drlg. 5,608 ft.
Mid-Kansas' No. 1 Stephens, Sec. 26, 1,800 ft. from N, 330 ft. E, El Paso County School Land ... Shut down 4,005 ft.

GAINES COUNTY

Louisiana Oil & Ref. Co.'s No. 1 Ralph, 1,320 ft. from S and W of Sec. 7, Blk. A-28, Public School Land ... Drlg. 4,670 ft.

GARZA COUNTY

Pandem Oil Corp.'s No. 1 Justice, 330 ft. from S and W of Sec. 12, Blk. 6, H.&G.N. Sur. ... Location.
Pandem Oil Corp.'s No. 1 Stokes, 2,310 ft. N and E of SW. Sec. 32, Blk. 5, G.H.&H.R.R. Sur. ... Total depth 3,018 ft.; show oil 2,908-18 ft.; plugged back to 2,938 ft.; cleaning out and plugging back to shut off water after 90-qt. shot from 2,908-28 ft.; 200 ft. oil and 1,700 ft. water in hole; cleaning out and plugging back.

GLASSCOCK COUNTY

Amerada Pet. Corp.'s No. 2 Coffee, 1,650 ft. S and 2,310 ft. E of NW cor. Sec. 22, Blk. 33, Twp. 2s, T.&P. R.R. Sur. ... Drlg. 2,130 ft.
California Co.'s No. 1 Baker, 2,310 ft. from S and 990 ft. from W, Sec. 23, Twp. 2s, Blk. 33, T.&P. Sur. ... Location.
California Co.'s No. 1 Jones, 330 ft. S from N and E lines, Sec. 25, Blk. 33, Twp. 2s, T.&P. Sur. ... Derrick.
Group No. 1 Oil Co. and Continental Oil Co.'s No. 1 Miller, 330 ft. S and 990 ft. E of NW cor. Sec. 162, Blk. 29, W.&N.W.R.R. Sur. ... Location.
Group No. 1 Oil and Continental Oil Co.'s No. 1 Phillips, 330 ft. S and 990 ft. E NW cor. Sec. 24, Blk. 33, Twp. 2s, T.&P.R.R. Sur. ... Drlg. 1,200 ft.
F. H. E. Oil Co.'s No. 1 Cox, 330 ft. from S and E of SW Sec. 8, Blk. 33, Twp. 2s, T.&P. Sur. ... Drlg. 1,250 ft.
Simms Oil Co.'s No. 2 Coffee, Sec. 22, Blk. 33, Twp. 2s, 1,650 ft. from N, 330 ft. E ... Top pay 2,175 ft.; 500 ft. oil in hole; fishing 2,300 ft.; 500 ft. oil in hole; top pay 2,175 ft.
Simms Oil Co.'s No. 3 Coffee, 990 ft. from N and 330 ft. from W of E half Sec. 22, Blk. 33, Twp. 2s ... Shut down 2,050 ft.
Timberlake & Snyder's No. 1 Meek, 2,310 ft. W and 1,600 ft. N of SE cor., Sec. 7, Blk. 34, Twp. 3s, T.&P. Sur... Show oil 970 ft.; drlg. 1,900 ft.
World Oil Co.'s No. 2-C McDowell, Sec. 21, Blk. 34, Twp. 2s, 330 ft. S and 2,310 ft. E of NW cor. ... Oil from 2,435-42 ft.; total depth 2,453 ft.; now pumping 5 bbls. oil and 12 bbls. water.

HOWARD COUNTY

American Maracaibo Co.'s No. 4-A Settle, 1,040 ft. S and 330 ft. E of NW cor. Sec. 6, Blk. 32, Twp. 2s, T.&P. Sur. ... Drlg. 1,993 ft.
California Co.'s No. 11 Roberts, Lease 2, 990 ft. N and 2,188 ft. W of SE cor. Sec. 137, Blk. 29, W.&N.W. R.R. Sur. ... Coring 2,630 ft.
Cosden Oil Co.'s No. 6 Roberts-A, 200 ft. N and E of SW cor. Sec. 129, Blk. 29, W.&N.W.R.R. Sur. ... Shut down 1,456 ft.; sulphur water 1,433-46 ft.
Continental Oil Co.'s No. 7-C Chalk, 1,990 ft. S and 2,440 ft. W of NE cor. Sec. 140, Blk. 29, W.&N.W. R.R. Sur. ... Shut down 1,757 ft.
Empire Gas & Fuel Co.'s No. 4 Clay, 330 ft. N and 2,310 ft. W of SE cor. Sec. 127, Blk. 29, W.&N.W.R.R. Sur. ... Total depth 2,105 ft.; plugged back to 1,835 ft.; top pay 1,751 ft.; increase 1,812 ft.; running tubing.
Group No. 1 and Continental Oil Co.'s No. 3 Overton, 990 ft. from N and 330 ft. from E line of Sec. 5, Blk. 32, Twp. 2s, T.&P.R.R. Sur. ... Total depth 2,284 ft.; top pay 2,148-53 ft.; increase 2,265 ft.; shot and cleaned out 2,025 ft.
McGinley-Sigler's No. 1 Hyman-B, 330 ft. S and W of NE cor. SW Sec. 89, Blk. 29, W.&N.W. Sur. ... 500,000 ft. sweet gas 1,241-50 ft.; total depth 1,600 ft.; salt water 1,465-70 ft.
McGinley-Sigler's No. 1 Hyman-C, 330 ft. N and 990 ft. W SE cor. Sec. 93, Blk. 29, W.&N.W.R.R. Sur. ... Location.
Merriwether's No. 1 Smith, 150 ft. from S, 2,490 ft. from W, Sec. 45, Blk. 33 ... Shut down 2,275 ft.;
Moody Oil Corp.'s No. 23-B Roberts, 990 ft. from N and W of Sec. 137, Blk. 29 ... Set 10-in. casing; shut down 261 ft.
Simms Oil Co.'s No. 2 Clay, 330 ft. from S, 2,310 ft. from W, Sec. 127, Blk. 29 ... Oil show 1,570-80 ft.; shut down 3,020 ft.

HUDSPETH COUNTY

California Co.'s No. 1 University, 3,821 ft. N and 2,554 ft. E of SW cor., Sec. 19, Blk. E ... Drlg. 3,820 ft.
Western States Oil Co.'s No. 1 Moore, C SE Sec. 16, Blk. 71, Twp. 6, T.&P. Sur. ... Shut down 2,760 ft.
Western States Oil Co.'s No. 1 Gardner & Moseley, NE NW, Sec. 12, Blk. 18 ... Fishing 3,155 ft.

IRION COUNTY

Baker & Hodges et al's No. 1 Tankersley, 750 ft. from N and 170 ft. from W of Sec. 23, G.C.&S.F. Sur. ... Location.
Beesley's No. 1 Sawyer Cattle Co., 1,320 ft. N and E of SW cor., Sec. 3,032, Blk. 24, H.&T.C.R.R. Sur. ... Set 6-in. casing 1,675 ft.; total depth 1,810 ft.; water 1,705-10 ft.; more water 1,730-40 ft.
Crawford Oil Co.'s No. 1 Williams, 450 ft. from N, 150 ft. from W, Subd. 8 ... Shut down 1,105 ft.
Kingwood Oil Co. et al's No. 1 J. D. Suggs, SE NW SE, Sec. 19, Blk. 7, H.&T.C. Sur. ... Show gas 7,656 ft.; encountered 2,400 ft. sulphur water 7,818 ft.; plugged back with lead wool to 7,718 ft.; plugged back with cement to 7,668 ft.; shot 20 qts. 7,645-68 ft.; no results; now plugging back to shoot upper shows
J. A. Starkweather's No. 1 Lindley, Sec. 1,160½, 900 ft. from S, 150 ft. from E, H.&T.C. Sur. on E ... Drlg. 2,200 ft.
P. H. Williams' No. 1 Ash, C of Sec. 20, Washington County ... Drlg. 7,700 ft.

JONES COUNTY

Continental Oil Co.'s No. 1 Phillips, 440 ft. from S and 330 ft. from E of Phillips 80-ac. tract, Sec. 16, Blk. 19, T.&P. Sur. ... Shut down 3,082 ft.
Mid-Tex Oil & Gas Co.'s No. 1 King ... Underreaming 6⅝-in. casing 1,682 ft.
Phillips Pet. Co.'s No. 1 Coates, 900 ft. S and 330 ft. W of NE cor. W half SW of Sec. 17, Blk. 19, T.&P.R.R. Sur. ... Location.
Shabeen et al's No. 1 King ... 800 ft. fluid in hole; shut down 2,204 ft.; top pay 2,061 ft.; cleaning out after shot.
W. S. Ware's No. 2 Newman, 150 ft. from N and 2,090 ft. from E of Sec. 52, Blk. 18, T.&P.R.R. Sur. ... Drlg. 2,533 ft.; show oil 2,531-33 ft.

KENT COUNTY

California and Atlantic's No. 1 Wallace, 330 ft. from S and W. Sec. 60, Blk. G, W.&N.W.R.R. Sur. ... Shut down 3,003 ft.
White & Smith's No. 1 Pursley estate, 1,320 ft. from E and 2,640 ft. from S of Sec. 8, Blk. H, H.&T.B. Sur... Shut down 273 ft.

KIMBLE COUNTY

C. L. Bryant et al's No. 1 Lambert, 700 ft. from N and W line of F. Lotta Sur. ... Shut down 800 ft.
McLean & Jamison's No. 1 Cannon, 1,940 ft. N and 300 ft. W of SE cor. Robert Cochran Sur. ... Fishing 1,650 ft.

LOVING COUNTY

California Co.'s No. 1 Allen, 330 ft. from SE and SW of Sec. 90, Blk. 1, W.&N.W. Sur. ... Building rig.
California Co.'s No. 1 Reagan & McElvain, 330 ft. SW of NE line and 330 ft. SE of NW line, Sec. 84, Blk. 1, W.&N.W.R.R. Sur. ... Material on ground.
Lockhart & Co.'s No. 3 Bowen & Wells, 330 ft. from NE and SE of Sec. 92, Blk. 1, W.&N.W. Sur. ... Skidding rig to location.
Hadlock et al's No. 2 Russell, 1,650 ft. SW of NE line, 2,310 ft. NW of SE line, Sec. 80, Blk. 1, W.&N.W. R.R. Sur. ... Rigging up.
Humble Oil & Ref. Co.'s No. 1 Kloh, 2,640 ft. N and W, Sec. 35, Blk. 55, Twp. 2, T.&P.R.R. Sur. ... Last salt 3,760 ft.; shut down 4,085 ft.
Lockhart & Co.'s No. 2 fee, 676 ft. S, 330 ft. W, Sec. 91, Blk. 1, W.&N.W. Sur. ... Spudded 140 ft.; shut down.
Lockhart & Co.'s No. 3 Hubbard, 1,650 ft. from NE line, 330 ft. NW line of Sec. 83, Blk. 33, H.&T.C.R.R. Sur.. Location.
Lockhart & Co.'s No. 5 Hubbard, 1,650 ft. SW of NE line and 330 ft. SE of NW line Sec. 83, Blk. 33, H.&T.C. ... Shut down 2,310 ft.; to test oil show 2,305-08 ft.

LYNN COUNTY

Lubewell Oil Co.'s No. 1 May, 2,310 ft. S, 2,310 ft. W, Sec. 10, Blk. 7, E.L.R.R. Sur. ... Shut down 190 ft. for casing.
George McCamey's No. 1 Edwards, 165 ft. N and E, Sec. 5, Blk. 2, L.S.&W. Sur. ... Top salt 2,140 ft.; oil show 1,580-90 ft.; hole full sulphur water 4,730 ft.; set 6-in. casing 4,733 ft.; shut down 5,040 ft.

MENARD COUNTY

Cromwell & Duffey's No. 2 Winslow, 250 ft. S and E of NW cor. NE of NE, Sec. 36, J. H. Gibson Sur. ... Drlg. 1,140 ft.
I. C. Barnett's No. 2 Callan, Sec. 1, 1,050 ft. from S, 1,190 ft. W ... 2½ bbls. water hourly, 1,100,000 ft. gas, 1,268 ft.
Priest's No. 1 Sorrell, 250 ft. N and 550 ft. W of SE cor. Sec. 132, E.L.R.R. Sur. ... Drlg. 578 ft.

MIDLAND COUNTY

Pure Oil Co.'s No. 1 Hutt, 2,310 ft. from N and 330 ft. from E of Sec. 14, Blk. 38, Twp. 4s, T.&P. Sur. ... Rig.

MITCHELL COUNTY

Magnolia Petroleum Co.'s No. 7 Mary Foster, 330 ft. from N and W line of Sec. 17, Blk. 29, Twp. 1s, T.&P.R.R. Sur. ... Drlg. 1,300 ft.
Morrison et al's No. 2 Morrison, 2,390 ft. from N and 660 ft. from E of Sec. 31, Blk. 28, Twp. 1n, T.&P. R.R. Sur. ... Rigging up.
Seiger's No. 1 Scott, C of NE of SW, Sec. 36, Blk. 17, S.P.R.R. Sur. ... Shut down 730 ft.
Teas & Wheeler's No. 1 Radford, 1,320 ft. N and W of Sec. 1, Blk. 27, T.&P. Sur. ... Cleaning out 4,820 ft.

NOLAN COUNTY

Gibson & Johnson's No. 1 Bond, 1,320 ft. from N and 1,980 ft. from E of Sec. 42, Blk. 20, T.&P. Sur. ... Drlg. 3,273 ft.

PECOS COUNTY

Amerada Pet. Corp.'s No. 1-B University, 1,650 ft. from W and 990 ft. from S. Sec. 32, Blk. 16 ... Shut down 988 ft.
Anderson et al's No. 1 McKenzie, 480 ft. from N and 330 ft. E of CNL Sec. 3, Blk. 604, G.C.&S.F. Sur. ... Location.
Atlantic O. P. Co.'s No. 1 Shearer, 330 ft. from NW and SW Sec. 107, Blk. 10, H.Y.N.R.R. Sur. ... Drlg. 895 ft.
Bennett et al's No. 1 fee, 330 ft. W of CWL of Sec. 1, Blk. 119, G.C.&S.F. Sur., but in Sec. 8 ... Spudded and shut down.
Continental Oil Co.'s No. 6 University, 330 ft. S and 3,031 ft. E of NW cor. of Sec. 6, Blk. 17, University Land ... Cellar.
E. W. Bateman et al's No. 1 Cordova, 3,490 ft. from N and 1,515 ft. from W, Sec. 29, Blk. 11, H.&G.N.R.R. Sur. ... Shut down 1,826 ft.
Cosby Prod. & Ref. Co.'s No. 1 Cordova, 330 ft. from N and E of S 320 ac., Sec. 11, Blk. 11, H.&G.N. Sur. ... Spudding.
Cosden Oil Co.'s No. 1 McDonald, 350 ft. from N and E of Sec. 1, H.E.&W.T. Sur. ... Flowing water 1,645 ft.; shut down 2,016 ft.
Cowboy Evans' No. 1 Pecos Valley, 1,307 ft. from SE line, 907 ft. from SW line to Sec. 36, Blk. 3, H.&T.C.R.R. Sur. ... Location.
Cromwell et al's No. 1 University, 1,980 ft. from S and 1,320 ft. from E, Sec. 16, Blk. 16 ... Location.
Dixie Oil Co.'s No. 1 McKinzie, 3,300 ft. from N and 2,025 ft. from W of Sec. 15, Blk. 604, G.C.&S.F. ... Shut down 2,150 ft.
Dixie Oil Co.'s No. 2 Torborg, 450 ft. N, 150 ft. E of SW cor. E half Sec. 539, Arnold & Barrett Sur. ... Shut down 295 ft.
A. M. Griffith's No. 1 Ferrenbach et al, 2,112 ft. from W line, 1,320 ft. from S line, Sec. 9, Blk. 603, G.C.&S.F. Sur. ... Drlg. 2,440 ft.
Galt-Brown's No. 1 Thompson, 660 ft. from S and 1,100 ft. from E Sec. 71, Blk. 194, G.C.&S.F. Sur. ... Cellar.
Hayes et al's No. 1 Lea, C NW of NE Sec. 9, Blk. 106, T.&St.L. Sur. ... Location.
Humble Oil & Ref. Co.'s No. 2 Cunningham, 2,640 ft. from N, 330 ft. from W line of Sec. 48, Blk. 11, H.&G.N.R.R. Sur. ... Drlg. 1,772 ft.
Hussman Oil Co.'s No. 1 Esters, 960 ft. from N and 300 ft. E. Sec. 83, Blk. OW, T.M.R.R. Sur. ... Drlg. 1,280 ft.
J. L. Kennedy's No. 1 Roberts, C of Sec. 78, Blk. 3, T.&P.R.R. Sur. ... Shut down 3,132 ft.
Landreth Prod. and Henshaw Bros.' No. 1-E University, 330 ft. N and W of SE cor. W half NE, Sec. 13, Blk. 18, University Land ... Waiting on cement to set 8¼-in. casing 950 ft.
Landreth Prod. and Henshaw Bros.' No. 2-I University, 330 ft. S and W of NE, Sec. 24, Blk. 18, University Land ... Cellar.
Martin A. Meyer et al's (formerly Mauch & Kroger) No. 1 Holmes, S half SW Sec. 5, Blk. 178, T.C. Sur. ... Shut down at 2,224 ft. with hole full of sulphur water.
R. E. Moore's No. 1 Arnold, 1,320 ft. from S and 660 ft. from E lines of Sec. 18, Blk. 1, H.&T.C.R.R. Sur. ... Show oil 1,216 ft.; show oil 1,402 ft.; pulling 8-in. casing; shut down 1,615 ft.
Mid-Kansas Oil & Gas Co.'s No. 8 M. A. Smith, 250 ft. N and 1,005 ft. W of NE cor., Sec. 21, Blk. 194, G.C.&S.F. Sur. ... Shut down 1,720 ft.; top pay 1,565 ft.; flowing 135 bbls. hr.
J. D. O'Mara's No. 1 Bennett, Sec. 592, 1,460 ft. from S, 150 ft. from E, G.C.&S.F. Sur. ... Cleaning out 875 ft.
J. D. O'Mara's No. 1 Streety, C of Sec. 1, W. P. Howard Sur. ... Show oil 1,785 ft.; drlg. 1,845 ft.

Pecos Crude Oil Pur. Co.'s No. 4 Pecos Valley, 770 ft. from SW and 1,320 ft. from SE of W, Sec. 22, Blk. 10, H.&G.N.R.R. Sur. — Top salt 985 ft.; top pay 1,622 ft.; shot 60 qts. 1,638-50 ft.; total depth 1,650 ft.; to run rods and tubing to test.

Peren Oil Co.'s No. 2 Eaton, C of E of W, Sec. 27, Blk. 3, H.&T.C.R.R. Sur. — Location.

M. M. Rowan's No. 1 University, NE, Sec. 25, Blk. 16 — Total depth 2,490 ft.; plugged back 1,815 ft.; machine moved off.

Phillips Pet. Co.'s No. 3 Monroe, 3,860 ft. from N and 660 ft. from E Sec. 39, Blk. 194, G.C.&S.F. — Cellar.

Phillips Pe.. Co.'s No. 5 Ramsey, 330 ft. from N and 1,650 ft. from W of Sec. 17, Blk. 194 — Shut down 620 ft.

Rector Oil Co.'s No. 1 Young, 330 ft. S and 1,650 ft. E of SW cor. Sec. 26, Blk. 9, H.&G.N. Sur., but in Sec. 4, Blk. 3, H.&T.C. Sur. — Location.

Southern Crude Oil Pur. Co.'s No. 1 McKenzie, Sec. 10, Blk. 604 — Drlg. 1,605 ft.

Shell Pet. Corp.'s No. 1 Percival, 330 ft. from N and E of SE, Sec. 199, Blk. 3, I.&G.N. Sur. — Location.

Shell Pet. Corp.'s No. 1-D University, 1,650 ft. from E and 990 ft. from W of Sec. 32, Blk. 16 — Shut down 945 ft.

Shell Pet. Corp.'s No. 2-B Smith, 1,006 ft. S and 330 ft. W of NE cor. Sec. 24, Blk. 194, G.C.&S.F.R.R. Sur. — Shut down 330 ft.

Shell Pet. Corp.'s No. 5 Smith-D, 990 ft. N and W of SE cor. of Sec. 24, Blk. 194, G.C.&S.F.R.R. Sur. — Drlg. by tools 435 ft.

Sides & Cloyd's No. 2 Blackstone & Slaughter, C NW of Sec. 34, Blk. A-2, T.&C.R.R. Sur. — Shut down 770 ft.

Simms Pet. Co.'s No. 1 University, 1,650 ft. N and 330 ft. W of SE cor. Sec. 21, Blk. 19, University Land — Drlg. 785 ft.

Skelly Oil Co.'s No. 1 Bowers, SW cor. N half SE, Sec. 31 Blk. 16 — Initial production 58 bbls. 1,649-50 ft.; swabbed 45 bbls. day; total depth 1,676 ft.; plugged back to 1,670 ft.; to clean out and pump.

Skelly Oil Co.'s No. 2 University-Bower, 330 ft. S and E of NW cor. of SE Sec. 31, Blk. 16, University — Drlg. 530 ft.

Transcontinental Oil Co.'s No. 1 University — Shut down 4,900 ft.

Transcontinental and Arkansas' No. 2 Matthews, 1,060 ft. from E and 330 ft. from N line of SE Sec. 10, Blk. 194, G.C.&S.F.R.R. Sur. — Location.

Transcontinental and Arkansas Fuel Oil Co.'s No. 1-A Smith, 2,310 ft. from N and 1,290 ft. from E of Sec. 11, Blk. 194, G.C.&S.F. Sur. — Underreaming 10-in. casing 575 ft.

Transcontinental Oil Co. et al's No. 2 Sellman, 990 ft. from N and 2,310 ft. from E of Sec. 8, Blk. Z, T.C. Sur. — Shut down 685 ft.

Trees Oil Co.'s No. 3 Trees, 330 ft. from S and W of Sec. 90, Blk. 8, H.&G.N. Sur. — Total depth 1,423 ft.; hole full sulphur water 1,305-12 ft.

World Oil Co.'s No. 2 University, Sec. 31, Blk. 16, 330 ft. from N, 2,310 ft. E — Total depth 1,659 ft.; show oil 1,642-45 ft.; water 1,654 ft.; to plug back to 1,620 ft. and test; 1,400 ft. sulphur water in hole 1,659 ft.

World Oil Co.'s No. 1-C University, 1,650 ft. from N, 990 ft. W, Sec. 7, Blk. 20, University Land — Set 10-in. casing 753 ft.; shut down 1,763 ft.

PRESIDIO COUNTY

Eastland Oil Co.'s No. 1 Tootle, C Sec. 17, Blk. 1, D.P. R.R. Sur. — Spudded; shut down.

REAGAN COUNTY

Big Lake Oil Co.'s No. 1-C University, 2,598 ft. S and 250 ft. W of NE cor., Sec. 1, Blk. 2, University Land — Top pay 2,903 ft.; 1,000 ft. fluid in hole; top pay 6,807 ft.; drlg. 8,430 ft.

Big Lake Oil Co.'s No. 4-C University, 1,120 ft. from N and 1,096 ft. from E of Sec. 1, Blk. 2 — Showing oil and gas at 8,220 ft.; total depth 8,220 ft.; flowed an average 176 bbls. daily.

Texon Oil & Land Co.'s No. 2-B University, 4,655 ft. from S, 250 ft. from W, Sec. 36, Blk. 9 — Drlg. 5,744 ft.

Texon Oil & Land Co.'s No. 3-B University, 2,240 ft. from S, 920 ft. from W. Sec. 36, Blk. 9 — Drlg. 3,583 ft.

REEVES COUNTY

Exploration Co.'s No. 1 A. A. Kinney, 1,500 ft. W of NE cor. Sec. 26, Blk. C-18, Public School Land, elev. 2,847 ft. — Shut down 2,990 ft.

E. T. Hansford's No. 1 Williams, 150 ft. from S and W, Sec. 17, Blk. 6, H.&G.N. Sur. — Shut down 380 ft.

Black & Fink's No. 1 Brooks, 1,980 ft. N and 660 ft. W Sec. 16, Blk. 59 — Drlg. 1,400 ft.

Southern Crude Oil Pur. Co.'s No. 1 Kloh-Rumsey, 2,310 ft. N and W SE cor., Sec. 23, Blk. 51 — Show oil 3,410-20 ft.; shut down 3,575 ft.

David R. Thompson's No. 1 A. A. Eddins, Sec. 9, Blk. C-1 — Shut down 5,658 ft.

RUNNELS COUNTY

Gibson & Johnson's No. 1 Johnson, 2,310 ft. N and 1,650 ft. W of SE cor., Sec. 150, E.T.R.R. Sur. — Drlg. 965 ft.

Gibson & Johnson's No. 2 Serratt, 2,310 ft. from S and 1,650 ft. from E of Sec. 150, E.T.R.R. Sur. — Derrick.

George W. Boyce's No. 1 Lang, 2,310 ft. N, 6,900 ft. E, Sec. 262 — Drlg. 2,045 ft.; show oil 2,028 ft.

McLean's No. 1 Clayton, 150 ft. from N line, 270 ft. from W line of Sec. 133 — Shut down 1,185 ft.

SCHLEICHER COUNTY

Delmar Oil Co.'s No. 1 O'Harrow, C of NW, Sec. 56, Blk. 1, G.H.&S.A.R.R. Sur. — Drlg. 2,560 ft.

Interstate's No. 1 Whitten, 1,320 ft. from N and W, Sec. 35, Blk. LL, T.C.R.R. Sur. — Drlg. 5,940 ft.

George Wilson's No. 1 Page, Sec. 40, Blk. L, 1,290 ft. from N, 1,470 ft. from W, G.H.&S.A.R.R. Sur. — Underreaming 8¼-in. casing; total depth 2,270 ft.

SCURRY COUNTY

Byrd & Harmon's No. 1 Murphy, Jr., 330 ft. from N and E of Sec. 114, Blk. 97, H.&T.C. Sur. — Shut down 1,732 ft.

Camp Spring Oil & Ref. Co.'s No. 3 Guinn, 1,300 ft. from S, 300 ft. from E. Sec. 12, Blk. 3, H.&T.C.R.R. Sur. — Underreaming 6⅝-in. casing; total depth 3,900 ft.

I. B. Mimms et al's No. 1 J. J. Koonsman, Sec. 216, Blk. 2, H.&T.C.R.R. Sur. — Spudded and shut down 300 ft.

G. E. Dickman and R. B. Pender et al's No. 1 F. C. Davis, 1,000 ft. N and 1,770 ft. W of SE cor. of Sec. 275, Blk. 2, H.&T.C. Sur. — Cleaning out 4,325 ft.

E. L. Smith Oil Co.'s No. 1 Moore, 1,320 ft. from S and W, Sec. 379, Blk. 97 — Top salt 750 ft.; encountered 500,000 ft. gas 1,510 ft.; oil show 2,215 ft.; shut down 4,050 ft.

Transcontinental Oil Co.'s No. 1 Peckham, 330 ft. from S and W of R. N. Miller Sur. — Driving 20-in. casing 460 ft.

SUTTON COUNTY

Independent Oil & Gas Co.'s No. 1 Willson, Sec. 30, Blk. A, 1,650 ft. from N, 2,310 ft. from W — Location.

TAYLOR COUNTY

Condor Pet. Co.'s No. 1 Allen, C of NW, Sec. 220, Blk. 64, H.T.C.R.R. Sur. — Underreaming 12½-in. casing 860 ft.

A. H. Gibson et al's No. 1 Cody, 888 ft. N and 160 ft. W of SE cor. Lot 2, Sec. 18, Guadalupe County School Land — Spudding.

Gibson & Johnson's No. 1 Bingham, 330 ft. N and E of SW cor. their 270.8-ac. tract, Sec. 31, Guadalupe County School Land — Rigging up.

John B. Jameson's No. 1 Webb, 1,170 ft. S and W of NE cor., Sec. 46, Lunatic Asylum Land — Show oil 4,917 ft.; shut down 5,338 ft.

TERRELL COUNTY

Big Bend Oil Co.'s No. 1 Bassett, C NW, Sec. 155, Blk. D, M.-K.-T.R.R. Sur. — Shut down 1,285 ft.

Keck Pecos Trust Co.'s No. 1 Hamilton, C Sec. 6, Georgetown Ry. Sur. — Shut down 3,150 ft.

Mrs. J. B. McPhee's No. 1 Sam Belt, C Sec. 78, Blk. D-7, E.L.R.R. Sur. — Shut down 880 ft.; moved off machine.

Transcontinental Oil Co.'s No. 1 Goode, 2,152 ft. from E and 330 ft. from S, Sec. 26, Blk. 161, G.C.&S.F.R.R. Sur. — Drlg. 2,140 ft.

Woodley & Jones' No. 1 Pankenham, C SE NW, Sec. 43, Blk. B-2, C.C.S.D.&N.G.R.R. Sur. — Shut down 640 ft.

TERRY COUNTY

Atlantic et al's No. 1 Carlisle, 990 ft. from S and E of Sec. 58, Blk. E, E.L.&R.R. Sur. — Location.

Kingsland Oil Prod. Co.'s No. 1 Brownfield, C NW SW SW, Sec. 7, Blk. 1-A, E.L.R.R. Sur. — Fishing baller 5,080 ft.

TOM GREEN COUNTY

Cannon et al's No. 1 Rust, 990 ft. S, 990 ft. W of NE cor. of Sec. 745 — Location.

Ellis et al's No. 1 Lewis, 450 ft. S and 150 ft. E of SE cor. of J.W. Sur. in Albert Black Sur., Sec. 75 — Show oil 428-43 ft.; shot 20 qts. 428-40 ft.; no results.

Fitzgerald & Taliaferro's No. 1 Bennett, C SW, Sec. 1,628, E. R. Ringer — Total depth 2,447 ft.; plugged back to 2,405 ft. to straighten hole.

E. W. Wiley et al's No. 1 Maier, 200 ft. from E, 110 ft. from N, Sec. 6, Blind Asylum Land — Total depth 420 ft.; underreaming 10-in. casing; show oil 418-20 ft.

UPTON COUNTY

Eppenauer Drlg. Co.'s No. 1 Chaney, 2,310 ft. from N and 330 ft. from W of Sec. 18, Blk. 3, M.-K.-T. Sur. — Rigging up machine.

Gulf Prod. Co.'s No. 3-B Hughes, 160 ft. N and 161 ft. W of most southerly SE cor. of their 200-ac. lease "B" out of Wm. Teer Sur. — Rig.

Pure Oil Co.'s No. 3 Hughes, 150 ft. S and 767 ft. E of NW of their 300 ac., Sec. 4, Wm. Teer Sur. — Partly rigged up; shut down 610 ft.

T. P. Coal & Oil Co.'s No. 1 Belcher, 1,320 ft. from N and 2,310 ft. from W line, Sec. 10, Blk. 4½, G.C.& S.F.R.R. Sur. — Drlg. 925 ft.

VAL VERDE COUNTY

Independent Operators' No. 1 Whitehead, SE SE Sec. 30, Blk. 4, I.&G.N. Sur., elev. 1,175 ft. — Shut down 4,850 ft.

O. O. Owen's No. 1 Mills, Sec. 128, Blk. 1, I.&G.N. Sur., elev. 2,130 ft. — Gas sand 2,491-2,520 ft.; tested 125-700 ft. gas; shut down 6,727 ft.

Phantom Oil Co.'s No. 1 Ingram, 175 ft. W of E line and 300 ft. N of S line, Sec. 44, Blk. D-8, E.L.&R.R. Sur. — Show oil 1,535 ft.; shut down 2,551 ft.

Valvert Oil Corp.'s No. 1 Bassett, C NE, Sec. 47, Blk. Y. — Shut down 4,009 ft.

WARD COUNTY

Alpine Oil & Gas Co.'s No. 1 Dakan, 228 ft. from NE and 150 ft. from SE line, Tract 8, Sec. 11, Blk. 5, H.&T.C. Sur. — 1,000 ft. oil in hole; top pay 2,148 ft.; total depth 2,210 ft.; preparing to put on pump.

E. J. Anderson's No. 1 Johnson, 150 ft. N, 345 ft. E, Sec. 7, Blk. 32, H.&T.C.R.R. Sur. — Top salt 815 ft.; total depth 2,183 ft.; top pay 2,156 ft. swabbing 20 bbls. per day.

Atlantic et al's No. 1 Dorr, 1,730 ft. S, 990 ft. W, Sec. 2, J. Howe Sur. — Underreaming 8-in. casing 1,250 ft.; cleaning out 1,705 ft.

Atlantic and Delmar's No. 1 Hayzlett, 1,650 ft. from NE and NW of Sec. 17, Blk. 5 — Location.

Gulf Prod. Co.'s No. 3 Hutchins, 2,310 ft. from N and 330 ft. from W, Sec. 1, Blk. F, G.M.M.B.&A. Sur. — Top salt 1,035 ft.; top brown lime 2,310 ft.; increase in gas 2,608-10 ft.; show oil 2,685 ft.; drlg. 2,824 ft.

Gulf Prod. Co.'s No. 7 O'Brien, 320 ft. Sand W, Sec. 22, Blk. F, G.M.M.B.&A. Sur. — Hole full sulphur water 3,408 ft.; slopped over casing; total depth 3,566 ft.; plugged back to 3,025 ft.; preparing to test.

Gulf Prod. Co.'s No. 3 Wristen Bros., 220 ft. NE of SW and 220 ft. SE of NW, Sec. 18, Blk. 5, H.&T.C. Sur. — Show gas 1,960-70 ft.; filling up with sulphur water 2,520-27 ft.; salt water 2,545; plugged back to 2,477 ft.

Tex-Oil Production Co.'s No. 1 Redman, 1,980 ft. NE of SW line and 1,980 ft. SE of NW line, Sec. 152, Blk. 34, H.&T.C.R.R. Sur. — Show gas 2,806-09 ft.; shot 30 qts. 3,245-75 ft.; drlg. 3,660 ft.; shot 120 qts. from 3,240-75 ft.; drlg. 4,352 ft.

Penn and Atlantic's No. 2 Bennett, 2,310 ft. S line, 1,650 ft. W line, Sec. 16, Blk. 34, H.&T.C.R.R. Sur. — Top pay 2,347 ft.; shut down 2,610 ft.; cleaning out to bottom; filled up 150 ft. in 2 days.

Richardson et al's No. 1 O'Brien et al, 332 ft. from N and 360 ft. from W Sec. 5, Blk. F, G.M.M.B.&A. Sur. — Rotary.

Shell Pet. Corp.'s No. 1 Owens, located NE cor. of Sec. 16, Blk. 15, H.&T.C.R.R. Sur. — Top pay 2,886-93 ft.; increase at 2,909 ft. and 3,023-32 ft.; shot 90 quarts from 2,473-93 ft.; increase in oil 3,022-32 ft.; drlg. 4,003 ft.; averaging 37 bbls. day.

Shipley et al's No. 4 Hayzlett, 2,050 ft. NW of SE and 2,420 ft. NE of SW line of Sec. 17, Blk. 5, H.&T.C. R.R. Sur. — Top salt 720 ft.; plugged back to 2,538 ft.; cleaning out to deepen.

Shipley et al's No. 5 Hayzlett, assume common line Secs. 16 and 17 is N and S, 220 ft. S and 1,910 ft. W, Sec. 17, Blk. 5 — Standard rig.

Shipley et al's No. 1 Monroe, 330 ft. SE SW, Sec. 3, Blk. 1 — Shut down 385 ft.

J. E. Smith's No. 1 Clement, 153 ft. SW of NE line and 153 ft. SE of NW line, Lot 7, Sec. 7, Blk. 32, H.&T.C.R.R. — Spudded and shut down.

Southern Crude Oil Purch. Co.'s No. 1 Harris, 1,458 ft. from N and 1,406 ft. from E of Sec. 30, Blk. B-19 — Drlg. 1,700 ft.

Sturm & Paine's No. 1 Cummins, 748 ft. from NE and 155 ft. from NW of Sec. 7, Blk. 32, H.&T.C.R.R. Sur. — Shut down 2,350 ft.; show oil and gas 2,170 ft.

Sun Oil Co.'s No. 2 Sealy, 330 ft. from N and E of Sec. 88, Blk. F, G.M.M.B.&A. Sur. — Drlg. 2,214 ft.

WINKLER COUNTY

A. W. Phillips' No. 2 Brown et al, 2,000 ft. S and W of NE, Sec. 4, Blk. B-5, Public School Land — Top salt 1,300 ft.; shut down 2,832 ft.; show oil 2,775-85 ft.

Cinderella Syndicate's No. 1 Hendricks, 330 ft. N, 1,650 ft. W. Sec. 42, Blk. 26, Public School Land — Total depth 150 ft.; rig.

Humble Oil & Ref. Co.'s No. 3 Wahon-B, 2,310 ft. S and W of NE cor. Sec. 47, Blk. 26, School Land — Drlg. 620 ft.

Liner Drlg. Co.'s No. 1 Campbell, 330 ft. from N and E cor., Sec. 2, Blk. B-5 — Top brown lime 2,510 ft.; shut down 3,685 ft.

Shell and The Texas Company's No. 1-B Cowden, 660 ft. from S and W of Sec. 39, Blk. B-5, Public School Land — Drlg. 1,280 ft.

Sun Oil Co.'s No. 1 Sealy, 2,310 ft. N line, 330 ft. from W line, Sec. 52, Blk. F, C.M.M.B.&A. Sur. — Drlg. 2,275 ft.

WILDCAT OPERATIONS IN TEXAS PANHANDLE

(Continued from Page 92)

DONLEY COUNTY

Blue Bonnett Oil Co.'s No. 1 Ball, 1,075 ft. N line, 985 ft. E line, Sec. 22, Blk. E, D.&P.R.R. Sur. ..... T.D. 3,006 ft.; contract depth.
Marine Oil Co.'s No. 1 Sawyer, C SW, Sec. 5, Blk. G, G.C.&S.F. Sur. ..... Drlg. 3,875 ft.

GRAY COUNTY

Adams Oil Co.'s No. 4 Morse, 330 ft. S and W, NE cor., Sec. 3, Blk. 26, H.&G.N.R.R. Sur. ..... S.D. 2,495 ft.; S.O.
Baldridge & Lilley's No. 1 Melton, 330 ft. N and W, E½ SE, Sec. 95, Blk. B-2, H.&G.N.R.R. Sur. ..... Rig.
Camel Oil Co.'s No. 2-B Harrah, 330 ft. N and E, Sec. 150, Blk. 3, I.&G.N.R.R. Sur. ..... Drlg. 2,140 ft.
Cockrell-McIlroy Oil Co.'s No. 1 Castleberry, 330 ft. S and E, Sec. 126, Blk. 3, I.&G.N. Sur. ..... Location.
Constantine et als' No. 1 Crews, 330 ft. S and W, NE cor. SW, Sec. 20, Blk. 30, H.&G.N.R.R. Sur. ..... S. G. 2,580-2,604 ft.; S. D. 2,642 ft.
Danciger Ref. and Champlin Ref. Co.'s No. 4 Cook-Faulkner, 330 ft. S, 1,146 ft. W, NE cor. E 120 ac., W 210 ac., Sec. 30, Blk. B-2, H.&G.N.R.R. Sur. .. Drlg. 1,275 ft.
Danciger Ref. and Champlin Ref. Co.'s No. 5 Cook-Faulkner, 330 ft. S, 706 ft. W, NE cor. E 120 ac., W 210 ac., Sec. 30, Blk. B-2, H.&G.N.R.R. Sur. ..... T.D. 380 ft; jnkd. hole; skidded rig 24 ft. east.
Danciger et als' No. 11 Jackson, 330 ft. S, 1,320 ft. W, NE cor. NW, Sec. 88, Blk. B-2, H.&G.N. Sur. ..... T.D. 2,906 ft.
Danciger O. & R. Co.'s No. 5 Morse, 330 ft. N and E, SW SW NW, Sec. 1, Blk. 26, H.&G.N.R.R. Sur. .... S.D. 2,505 ft.
Danciger O. & R. Co.'s No. 1 Shaw, 330 ft. S, 286 ft. E of E 39½ ac., NW, Sec. 5, Blk. 1, A.C.H.&B. Sur. .. T.D. 2,588 ft.
Danciger O. & R. Co.'s No. 1 Williams, 330 ft. N, 330 ft. E, S½ NW ..... Estimated 15,000,000 ft. gas 2,610-70 ft.; S.D. 2,720 ft.
Dixon Creek Oil Co.'s No. 1 Harrah, 330 ft. ea. way NW cor. SE NE, Sec. 150, Blk. 3, I.&G.N.R.R. Sur... Drlg. 1,115 ft.
Dunlop's No. 4 Morse, 330 ft. N and E, SW cor. SW, Sec. 17, Blk. A-9, H.&G.N.R.R. Sur. ..... T.D. 2,431 ft.
Follet Pet. Corp.'s No. 1 Hood, 330 ft. S and W of W 80 ac., SW, Sec. 32, Blk. 3, H.&G.N.R.R. Sur. ..... Drlg. 390 ft.
Sines & Reiger's (formerly Eslick et als') No. 1 Mrs. J. A. Hopkins, NW cor. W 80 ac., SW, Sec. 84, Blk. B-2, H.&T.C. Sur. ..... S.D. 3,206 ft.
Gardner Bros. and Collins' No. 2 Saunders, 955 ft. S, 330 ft. E of W 68 ac., E½, J. G. Eustice Sur. ..... Location.
Grallup et als' No. 1 Morse, 330 ft. ea. way, NE cor. SE, Sec. 3, Blk. 26, H.&G.N.R.R. Sur. ..... Drlg. 1,515 ft.
Gulf Prod. Co.'s No. 1 Barrett, 967 ft. N and E, SW cor. NE, Sec. 131, Blk. 3, I.&G.N.R.R. Sur. ..... S.D. 2,900 ft.
Gulf Prod. Co.'s No. 1 Bowers, 967 ft. N and E, SW cor. SE, Sec. 63, Blk. B-2, H.&G.N.R.R. Sur. ..... Drlg. 710 ft.
Gulf Prod. Co.'s No. 3 Worley-A, 330 ft. N, 1,650 ft. W, SE SW, Sec. 36, Blk. 3, I.&G.N.R.R. Sur. ..... S. D. 4,810 ft.
Haymer O. & G. Co.'s No. 1 Morse, 330 ft. ea. way out of SE cor. E½ SE, Sec. 45, Blk. A-9, H.&G.N. Sur. ..... Drlg. 2,175 ft.
Herragan Oil Co.'s No. 1 Bradford, 330 ft. N, 990 ft. E, Sec. 123, Blk. B-2 ..... First S.G. 2,475-80 ft.; 15,000,000 ft. gas 2,515-40 ft.; S.O. 2,932-50 ft.; S.D. 3,140 ft.
Humble O. & R. Co.'s No. 1 Combs-Worley, 330 ft. S and W, N½ SE, Sec. 36, Blk. 3, I.&G.N.R.R. Sur. .. S.G. 2,340-45 ft. and 2,420 ft; T. D. 2,800 ft.
Lenix et als' No. 1 Bradford, 330 ft. N and E, W½ SE, Sec. 118, Blk. B-2, H.&G.N.R.R. Sur. ..... Rigging up.
Lyon et als' No. 1-A Morse, 330 ft. S and W, NW NW, Sec. 1, Blk. 26, H.&G.N.R.R. Sur. ..... Rig.
Jean Pet. Co.'s No. 1 Furneaux Bros., 330 ft. N and W cor. SE, Sec. 200, Blk. B-2, H.&T.N. Sur. ..... Spudded and S.D.
Magnolia Pet. Co.'s No. 4 Harrah, 330 ft. ea. way, SW cor. NW, Sec. 150, Blk. 3, I.&G.N.R.R. Sur. .... Drlg. 1,340 ft.
Magnolia Pet. Co.'s No. 1 Cubine, 330 ft. N and W, NE, Sec. 36, Blk. 25, H.&G.N.R.R. Sur. ..... Drlg. 312 ft.
Magnolia Pet. Co.'s No. 5 Magnolia, 990 ft. N, 330 ft. E, SW cor., Sec. 14, Blk. 3, I.&G.N.R.R. Sur. ..... Rigging up.
Magnolia Pet. Co.'s No. 4 Wright, 330 ft. N and W, SE cor. S½ SW, Sec. 13, Blk. 3, I.&G.N.R.R. Sur. .. Drlg. 1,710 ft.
Magnolia Pet. Co.'s No. 5 Wright, 330 ft. N, 752 ft. W, SE cor. S½ SW, Sec. 13, Blk. 3, I.&G.N.R.R. Sur. .. Drlg. 950 ft.
McAuley et als' No. 4 Morse, 330 ft. N and W, SE cor. NE, Sec. 2, Blk. 26, H.&G.N.R.R. Sur. ..... Location.
McIlroy Oil Co.'s No. 1 Arnold, 330 ft. ea. way, NW cor. NW, Sec. 139, Blk. 3, I.&G.N.R.R. Sur. ..... Drlg. 2,835 ft.
McMan O. & G. Co.'s No. 7 Palmer, 990 ft. S, 990 ft. W, NE cor. E 100 ac. of W 200 ac., Sec. 31, Blk. B-2, H.&G.N.R.R. Sur. ..... S.G. 2,850 ft; S.O. 2,857 ft; T.D. 2,935 ft; will swb. to test; 1,000 ft. oil in hole.
Mid-Continent Pet. Corp.'s No. 1 Laugham, 330 ft. S and W, W 231½ ac. of N 310½ ac., Sec. 1, Blk. B-2, H.&G.N. Sur. ..... Location.
Operators Royalty Co.'s No. 1 Eddington, 330 ft. ea. way, NE cor. NW, Sec. 34, Blk. B-2, H.&G.N.R.R. Sur. ..... S.D. 2,719 ft; S.G. 2,655-93 ft.
Oil Operators' No. 1 Bowers, 330 ft. N, 330 ft. E, Sec. 93, Blk. B-2, H.&G.N. Sur. ..... Show oil and gas 2,400-17 ft.; S.O. 3,036-55 ft.; first gas 2,483 ft. increase at 2,500 ft., 2,544 ft. and 2,950 ft.; S.D. 3,090 ft.
Operators Oil Co.'s No. 5 Cook-Faulkner, 990 ft. N, 330 ft. W, SE, W 90 ac., Sec. 30, Blk. B-2, H.&G. N. Sur. ..... S.D. 884 ft.; spraying 5 bbls. oil per hr; T.P. 2,860 ft; T.D. 2,-970 ft; P.B. 2,904 ft; 1,500 ft. oil in hole; 1,500 ft. fluid in hole 2,860-2,903 ft; will swb. to test.
Prairie O. & G. Co.'s No. 2 Langham, 330 ft. S and E, NW cor., W 230.3 ac., of S 310.5 ac., Sec. 1, Blk. B-2, H.&G.N. Sur. ..... Location.
Phillips Pet. Co.'s No. 1 Wright-Wood, 330 ft. N, 990 ft. E, SW cor. N½ SW, Sec. 13, Blk. 3, I.&G.N.R. R. Sur. ..... Location.
Phillips Pet. Co.'s No. 2 Wright-Wood, 330 ft. N, 990 ft. W, SE cor. N½ SW, Sec. 13, Blk. 3, I.&G.N. Sur... Location.
Reynolds et als' No. 1 Webb, 330 ft. N, 330 ft. E, NW, Sec. 60, Blk. 25, H.&G.N.R.R. Sur. ..... Rig.
Rieger & Steckoll's No. 1 Bohr, 330 ft. S and E, Sec. 37, Blk. B-3, H.&G.N. Sur. ..... Drlg. 3,395 ft.
Smith & McDaniel's No. 1 Noble, 230 ft. N, 943 ft. E, SW NE, Sec. 49, Blk. A-9, H.&G.N.R.R. Sur. ..... Drlg. 2,828 ft; 3 bailers oil per hr. 2,750-75 ft; increase at 2,-814 ft; to shoot.
St. Clair Oil Co.'s No. 1 L. S. Stockton, SE cor., Sec. 35, W. R. Lee Sur. ..... Spudded and S.D.
Stover and Shell's No. 1 Saunders, 990 ft. N, 330 ft. E, N 100 ac. of W 149 ac., Sec. 3, B.&B. Sur. ..... 4,000,000 ft. gas 2,258-2,370 ft; fishing 2,580 ft.
Southern Explin. Co.'s No. 1 Noel, 330 ft. S and W, W½ NW, Sec. 138, Blk. 3, I.&G.N.R.R. Sur. ..... Drlg. 2,900 ft.
The Texas Co.'s No. 1 Bell, 2,310 ft. N, 2,640 ft. W, Sec. 133, Blk. B-2, H.&G.N.R.R. Sur. ..... Drlg. 2,800 ft.
The Texas Co.'s No. 15 Saunders, 330 ft. N and W, SE cor. W½ SE, Sec. 4, Blk. 1, A.C.H.&B. Sur. .... S.D. 2,610 ft.
The Texas Co.'s No. 1 Wright, 330 ft. S and W, SE, Sec. 13, Blk. 3, I.&G.N.R.R. Sur. ..... Drlg. 1,735 ft.
Travis & Reiger's No. 1 Mackie, 330 ft. N and E, Sec. 114, Blk. B-2, H.&G.N.R.R. Sur. ..... 16,000,000 ft. gas; T.P. 2,685 ft.; rig burned 3,343 ft.
Travis et als' No. 1-B Webb, 330 ft. N and W, Sec. 61, Blk. 25, H.&G.N.R.R. Sur. ..... Swbd. 50 bbls. in 3 hrs; swbd. dry to shoot; T.P. 2,610-18 ft; T.D. 2,641 ft; shot 60 qts. from 2,611-31 ft; 1,400 ft. oil in hole; C.O.
Tripplehorn Oil Co.'s No. 1 Morse, 330 ft. S and W, SW SE, Sec. 17, Blk. A-9, H.&G.N.R.R. Sur. ..... Drlg. 2,320 ft.
Vulcan O. & G. Co.'s No. 1 Carpenter, 330 ft. N and W, W 80 ac., NW, Sec. 25, Blk. 25, H.&G.N.R.R. Sur. ..... T.D. 1,520 ft.; waiting on csg.
Wilson et als' No. 1 Heaston, 330 ft. S and W, Sec. 160, Blk. B-2, H.&G.N.R.R. Sur. ..... Drlg. 475 ft.
Wright Wilson, trustee's No. 1 Chapman, 175 ft. S and E lines, N½ NW, Sec. 69, Blk. 25, H.&G.N. Sur. ... S.O. 2,685 ft.; S.D. 2,693 ft.
Wilcox-Pampa Oil Co.'s No. 10 Combs-Worley, 330 ft. S and W, NE cor. SW SW, Sec. 35, Blk. 3, I.&G. N.R.R. Sur. ..... S.D. 2,820 ft.; 32,000,000 ft. gas and 90 bbls. oil first 7 hrs.; T. P. 2,811-13 ft.

HARTLEY COUNTY

Dana O. & G. Co.'s No. 1 Fritz, C NE, Sec. 81, Blk. 44, H.&T.C.R.R. Sur. ..... Drlg. 2,815 ft.

HUTCHINSON COUNTY

Alamosa Oil Co.'s No. 4 Sanford, 210 ft. S, 320 ft. W, NE cor. N 160 ac., S 240 ac., Sec. 85, Blk. 46, H. &T.C. Sur. ..... S.O. and wtr. 3,010-11 ft.; S.D. 3,095 ft.
Alexander et als' No. 1 Johnson, 1,709 ft. E, 330 ft. N, N 80 ac., E½, E. T. Tomlinson Sur. ..... Drlg. 940 ft.
Barnsdall Oil Co.'s No. 4 Prichard "A," C SW NW, Sec. 3, Blk. 4, D.&S.E. Sur. ..... Drlg. 2,565 ft.
Continental Oil Co.'s No. 1 Johnson-E, 330 ft. N and E, SW cor. SE, Sec. 5, Blk. I, R.&B. Sur. ..... Drlg. 1,215 ft.
Danciger O. & R. Co.'s No. 1 Cheatham, 330 ft. N and E, SW SE, Sec. 38, Blk. Y, A.&B. Sur. ..... Drlg. 1,290 ft.
Danciger O. & R. Co.'s No. 3 Moore, 330 ft. S and E, NW W½ SE, Sec. 125, Blk. 4, I.&G.N.R.R. Sur. .... 1,000 ft. oil in hole; T.P. 3,003-20 ft.; S.D. 3,030 ft.
Danciger O. & G. Co.'s No. 4 Moore, 330 ft. N and E, SW cor. W½ SE, Sec. 125, Blk. 4, I.&G.N.R.R. Sur. Set 6-in. csg. at 2,825 ft.
Dixon Creek Oil Co.'s No. 1 Cheatham, 990 ft. E, 330 ft. S, N½ SE, Sec. 38, Blk. Y ..... Drlg. 910 ft.
Dixon Creek Oil Co.'s No. 2 Cheatham, 330 ft. N, 1,650 ft. W, SE cor. N½ SE, Sec. 38, Blk. Y ..... Drlg. 275 ft.
Dixon Creek Oil Co.'s No. 1 Johnson Bros., 50 ft. S, 330 ft. W, NE cor. E 80 ac., J. Gammon Sur. ..... Fishing 930 ft.
Gulf Prod. Co.'s No. 1 W. E. Herring, 1,320 ft. N, 1,-395 ft. E, SW cor., Sec. 5, Blk. J, H.&G.N. Sur. .... Drlg. 1,962 ft.
Gulf Prod. Co.'s No. 1 Herring-A, 990 ft. S, 990 ft. W, NE cor., George Bazon Sur. ..... S.D. 1,300 ft.
Huey et als' No. 3 Smith et al, 330 ft. N, 660 ft. W, S 40 ac., E 100 ac., SE, Sec. 12, Blk. Y ..... Fishing 2,702 ft.
Midwest Explin. Co.'s No. 1-B Pitcher, 330 ft. E and S line, W½ SW, Sec. 19, T.C.R.R. Sur. ..... Drlg. 2,030 ft.
Phillips Pet. Co.'s No. 2 Cheatham, 330 ft. S and E, NW cor. SE SE, Sec. 38, Blk. Y ..... Drlg. 1,185 ft.
Phillips Pet. Co.'s No. 1 Johnson-Burl, 330 ft. S and W, NE cor. W 240 ac., N 320 ac., Sec. 4, Blk. 1, B.&B. Sur. ..... Rigging up.
Phillips Pet. Co.'s No. 1 Johnson-Juanita, 330 ft. N and W, SE cor. W½, Sec. 5, Blk. I, B.&B. Sur. .... Drlg. 1,350 ft.
Phillips Pet. Co.'s No. 1 Johnson-Trammel, 930 ft. N, 330 ft. W, SE cor. W½ NW, Sec. 38, Blk. Y ..... Drlg. 890 ft.
Phillips Pet. Co.'s No. 1 Johnson-Mayer, 990 ft. N and 990 ft. W line, NE, Sec. 37, Blk. Y, A.&B. Sur. .... Fishing 890 ft.
Phillips Pet. Co.'s No. 1 Johnson-Royal, 330 ft. S and E, NW cor. E½ NW, Sec. 34, Blk. Y ..... Drlg. 520 ft.
Phillips Pet. Co.'s No. 1 Johnson-Rudy, 330 ft. W, 330 ft. S, SW SW, Sec. 30, Blk. Y, A.&B. Sur. ..... Drlg. 1,380 ft.
Skelly Oil Co.'s No. 1 Byrd, 2,640 ft. E line, 3,960 ft. S line, W 3,094 ac., D. Luce Sur. ..... Drlg. 2,540 ft.
Spurlock et als' No. 1-A Christian, 440 ft. S, 330 ft. W, NE cor. SE SE, Sec. 33, Blk. Y ..... S.D. 320 ft.
The Texas Co.'s No. 5 Moore, 330 ft. N and W, SE cor. SW, Sec. 125, Blk. 4, I.&G.N.R.R. Sur. ..... Rigging up.
Texarado Oil Co.'s No. 2 Sanford, 330 ft. S, 990 ft. W, NE cor. N 80 ac., S 160 ac., Sec. 83, Blk. 46, H.& T.C.R.R. Sur. ..... Drlg. 1,030 ft.

LAMB COUNTY

Graham O. & G. Co. et als' No. 1 Ellwood, CWL, Sec. 9, Blk. T. T. A. Thompson Sur. ..... Fishing 4,385 ft.

LIPSCOMB COUNTY

Brown et als' No. 1 Box T Ranch, SW NE, Sec. 612, H.&T.C. Sur. ..... S.D. 3,750 ft.
Okla. Public Service Co.'s No. 1 C. W. Jones, NE SW, Sec. 100, H.&T.C. Sur. ..... Fishing 4,954 ft.

LUBBOCK COUNTY

Center Oil Co.'s No. 1 Bowles Ranch ..... Small S.O. 4,133-40 ft.; S.D. 4,167 ft.

MOORE COUNTY

Canadian River Gas Co.'s No. 1-C Sneed, 660 ft. N and E, SW, Sec. 46, Blk. 6-T, T.&N.O.R.R. Sur. ... Drlg. 1,980 ft.
Fritch O. & G. Co.'s No. 1 Lee Bivins, C N 40 ac., N 160 ac., Sec. 4, Geo. Mahan Sur. ..... 2,000,000 ft. gas 1,550-65 ft.; T.D. 3,212 ft.; S.O. 3,188 ft.; shot 40 qts. from 3,182-3,202 ft.; no results.
Gulf Prod. Co.'s No. 1 Kilgore, C SW, Sec. 22, Blk. P.Mc., E.L.R.R. Sur. ..... Drlg. 1,910 ft.
Operators Royalty Co. et als' No. 1 Jones, 330 ft. S line, 330 ft. E line, SW SW, Sec. 164, Blk. 3-B, T.&N.O.R.R. Sur. ..... C.O. 2,525 ft.
Red River Gas Co.'s No. 1 J. M. Shelton, 330 ft. ea. way from SE cor., Sec. 52, Blk. 3, G.&M. Sur. ..... Drlg. 2,625 ft.

MOTLEY COUNTY

Explin. Co.'s No. 6 Matador, 330 ft. N line, 330 ft. E line, Sec. 132, Blk. M ..... S.D. 4,011 ft.
Matador Oil Corp.'s No. 1 Owens, C NE, Sec. 10, Blk. G, B.&B. Sur. ..... S.D. 580 ft.

POTTER COUNTY

Canadian River Gas Co.'s No. 1-N Masterson, 330 ft. E, 1,320 ft. S, Sec. 17, Blk. 3, G.&M.R.R. Sur. ..... Rig.

RANDALL COUNTY

W. A. Patterson's No. 1 Palo Duro, Sec. 60, Blk. K-14 .. S.D. 1,250 ft.

ROBERTS COUNTY

Big Bend Oil Co.'s No. 1 Ledrick, Sec. 7, Blk. A-5 .... Shot 10 qts. 5,270-93 ft.; S.O. 5,-288 ft; S.D. 5,992 ft.

TERRY COUNTY

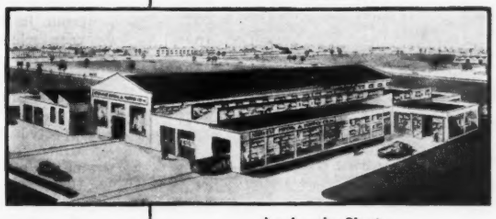
Atlantic O. P. Co. et als' No. 1 Carlisle, 990 ft. S and E, Sec. 58, Blk. E, E.L.R.R. Sur. ..... Location.

WHEELER COUNTY

Dunaway Bros.' No. 1 Worley, 330 ft. S and W, NE cor. NW, Sec. 39, Blk. 24, H.&G.N.R.R. Sur. ..... S.D. 815 ft.
Lone Star Gas Co.'s No. 1 Brown, C NW NE, Sec. 53, Blk. 23, H.&G.N.R.R. Sur. ..... Location.
Lone Star Gas Co.'s No. 3 Linkey, 330 ft. S and W, NE cor., Sec. 106, Blk. 23, H.&G.N.R.R. Sur. ..... Drlg. 1,163 ft.
Lone Star Gas Co.'s No. 1 Ridinger, C NW NW, Sec. 65, Blk. 17, H.&G.N. Sur. ..... Rig on ground.
Wischkamper et als' No. 2 Brown, C SE NE, Sec. 53, Blk. 23, H.&G.N.R.R. Sur. ..... Spudding 180 ft.

St. Louis Plant

Passaic, N. J., Plant



Los Angeles Plant

A CONSTANTLY increasing number of refineries and industrial concerns from coast-to-coast is finding it advantageous to use the Midwest Nation-wide Piping Service whenever fabricated piping is required.

There are several very good reasons for this condition: the modern facilities and experienced organization of each of the three Midwest plants assure the highest grade workmanship—the economies resulting from large scale operation—the unexcelled store of specialized piping experience that is available to all piping users in the solution of their problems.

It will be to your advantage to get in touch with the nearest Midwest office whenever you need piping—piping for a complete refinery or simply a bend, welded header or coil.

MIDWEST PIPING & SUPPLY CO., INC.

Main Office—1450 So. Second St., St. Louis

Chicago,
208 S. La Salle St.

Los Angeles,
520 N. Anderson St.

Tulsa,
805 Mayo Bldg.

New York
(Ballwood Division), 30 Church St.

Bureau of Mines Annual Report for Year 1929

Compiled by E. B. Swanson, Acting Chief Economist, Division of Petroleum Economics.

According to preliminary figures compiled by the Bureau of Mines, Department of Commerce, from companies that operate gathering lines, 1,005,598 bbls. of crude petroleum was transported from producing properties in the United States during 1929. The final figure of actual production (oil brought to the surface), which will include revisions to the monthly data, crude oil consumed on the leases, and the net change in producers' stocks, may amount to 1,006,000,000 bbls. This represents a new record for total production and is 104,500,000 bbls., or 12 per cent, above the 1928 output.

According to preliminary data, the world's production of crude petroleum in 1929 amounted to 1,488,604,000 bbls., an increase over 1928 of 12 per cent. Of this total the United States produced 67.6 per cent as compared with 68 per cent in 1928 and 71.4 per cent in 1927.

The production of crude petroleum in the United States increased more or less steadily up to August, the peak month. The total output in August amounted to 92,288,000 bbls., or very close to a daily average of 3,000,000 bbls. Production decreased steadily during the last four months of the year but this came coincident with a steadily decreasing demand and stocks accumulated in all months except November. A factor in the increased output during the summer months was a price increase inaugurated in the Mid-Continent in May.

Stocks of all oils increased 67,606,000 bbls. in 1929, of which over 18,000,000 bbls. was in refined products. November was the only month of the year 1929 to show a decrease in stocks of all oils. This decrease amounted to 3,010,000 bbls., and resulted mainly from a drastic curtailment at Santa Fe Springs and a surprisingly small decrease in gasoline consumption.

Texas, for the second successive year, was the leading producing State, with an output of 298,441,000 bbls. California was comparatively close to the top with a production of 292,037,000 bbls. Oklahoma dropped from second to third place, although its output of 253,704,000 bbls. represented a small increase over 1928. These three states accounted for 84 per cent of the total output as compared with 82 per cent in 1928. The major portion of the new production in Texas came from West Texas, Gray County (Panhandle), the Bruner Field in Guadalupe County and from extensions and deeper wells in the Gulf Coast fields.

The most important factors in the increased output of California were the rapid development of the various deep sands at Santa Fe Springs and the new production secured at Elwood. Despite the discovery of a number of new pools in the Greater Seminole area and the extension of some of the older ones, the output of the Greater Seminole area showed comparatively little change in 1929. The major portion of the new production of the State was developed at the Oklahoma City Field, which produced nearly 9,000,000 bbls. in 1929 as compared with practically nothing in 1928. The output of the Appalachian district was higher, that of the Central States, except Michigan, was lower.

Imports of crude petroleum during 1929 amounted to 78,915,000 bbls., or about 850,000 bbls. under the 1928 figure. Over 50,000,000 bbls. of these imports came from Venezuela and nearly 13,000,000 bbls. each from Mexico and Colombia. Exports of crude oil increased from 18,966,000 bbls. in 1928 to 26,374,000 bbls. in 1929, or 39 per cent.

Stocks of crude petroleum (exclusive of producers' stocks) east of California increased from 368,353,000 bbls. on hand January 1 to 381,391,000 bbls. on December 31, an increase of about 13,000,000 bbls. This increase was less than the 1928 increase but in California the situation was quite different with about 36,000,000 bbls. added to crude and fuel stocks compared with 2,000,000 bbls. accumulated in 1928.

Refined Products

Runs to stills of crude petroleum, both domestic and foreign, in 1929 amounted to 987,708,000 bbls., an increase over 1928 of 8 per cent. All of this increase was recorded in domestic crude runs; in fact, the use of foreign crude at refineries declined by slightly over 2,000,000 bbls. in 1929.

The percentage recovery of gasoline continued its upward trend and amounted to 44 per cent in 1929, as compared with 41 per cent in 1928. This and the increased quantity of crude processed was reflected in a 15 per cent gain in output which, for the year, totaled 434,241,000 bbls. The indicated domestic demand for gasoline amounted to 371,852,000 bbls., an increase over 1928 of 13 per cent. Gasoline exports increased 16 per cent; imports more than doubled and amounted to 8,868,000 bbls. Stocks of gasoline accumulated rapidly early in the year, particularly in January, reached a peak of 48,205,000 bbls. on March 31, was at its low point of 33,222,000 on September 30, and increased to a total of 43,115,000 bbls. on the last of the year, this being over 10,000,000 bbls. above the total on the first of the year.

The statistics of both kerosene and lubricants in 1929 were practically unchanged from 1928. The production of gas oil and fuel oil increased, due to the greater crude throughput but the demand east of California increased sufficiently to result in a decline in stocks of 500,000 bbls. Wax production was unchanged but demand, both from domestic and foreign sources, decreased and stocks increased materially.

Natural Gasoline

According to the monthly (preliminary) figures, the output of natural gasoline in 1929 was 2,195,400,000 gallons as compared with 1,777,700,000 gallons in 1928, a gain of 23 per cent. The major portion of the increase was recorded in the California fields, particularly at Santa Fe Springs, although the Greater Seminole area recorded a somewhat surprising increase of nearly 100,000,000 gallons. Stocks at the plants were practically unchanged, hence the increase in output was absorbed by refineries for blending purposes and by the export trade, which is reported to have grown rapidly in 1929.

World's Production

The world's production of crude petroleum during 1929 is estimated at 1,488,604,000 bbls., an increase over 1928 of 163,870,000 bbls., or 12.4 per cent. Production outside of the United States reached a total of 482,604,000 bbls., or 59,344,000 bbls. more than in 1928. Domestic production is estimated at 1,006,000,000 bbls., an increase of 104,526,000 bbls. The rate of increase in domestic production did not quite equal that of the foreign oil-producing countries, consequently, the ratio of the United States production to the world total dropped from 68 per cent in 1928 to 67.6 per cent in 1929. Venezuela and Russia maintained their respective positions as the second and third largest producing countries, while Persia, with a production of slightly more than 6,000,000 metric tons, moved into fourth place, with a slight margin over Mexico. Trinidad advanced into tenth place, ahead of Argentina and British India, while among the smaller producing countries, Russian Sakhalin and Canada reached, for the first time, an annual production of more than 1,000,000 bbls.

The three principal shipping fields in Venezuela, Lagunillas, La Rosa-Ambrosio, and Mene Grande, showed an increase of approximately 32,000,000 bbls. over 1928, accounting for virtually all of the increased production of the country. Production in Russian increased by approximately 15,000,000 bbls. Persia and Rumania continued to increase crude oil production at the rate noted for the two preceding years, while Mexico again showed a decrease. Production of heavy crude in Mexico declined throughout the year, while light oil production increased primarily as the result of new developments at Tonala, Isthmus of Tehuantepec.

The following table shows the output of the various oil-producing countries as reported officially to the Bureau of Mines for 1927 and 1928 and the estimated production of these countries for 1929. These estimates are based upon data obtained through the co-operation of consular officers in various foreign countries, various companies engaged in foreign production and official reports.

WORLD CRUDE OIL PRODUCTION, 1927-1929

(Figures in thousands of barrels)

Country—	1929* Amount	1929* Pct.	1928 Amount	1928 Pct.	1927 Amount	1927 Pct.
United States	1,006,000	67.6	901,474	68.0	901,129	71.4
Venezuela	137,000	9.2	105,749	8.0	63,134	5.0
Russia	103,000	6.9	†84,704	6.4	77,018	6.1
Persia	45,250	3.0	43,461	3.3	39,688	3.2
Mexico	44,689	3.0	50,151	3.8	64,121	5.1
Netherland East Indies	37,924	2.6	32,118	2.4	27,459	2.2
Rumania	34,930	2.3	30,773	2.3	26,368	2.1
Colombia	20,385	1.4	19,897	1.5	15,014	1.2
Peru	13,404	.9	12,006	.9	10,127	.8
Trinidad	8,810	.6	7,684	.6	5,380	.4
Argentina	8,800	.6	9,070	.7	8,630	.7
India, British	8,470	.6	8,741	.7	8,032	.6
British Borneo (Sarawak)	5,277	.4	5,223	.4	4,943	.4
Poland	4,953	.3	5,493	.4	5,342	.4
Japan (including Taiwan)	2,010	.1	1,944	.1	1,789	.1
Egypt	1,866	.1	1,842	.1	1,267	.1
Ecuador	1,351	.1	1,084	.1	537	..
Sakhalin, Russian	1,160	.1	677	..	440	..
Canada	1,133	.1	624	..	477	..
Iraq	798	..	713	..	338	..
Germany	711	..	630	..	663	..
France	516	.1	512	.3	504	.2
Czechoslovakia	93	..	94	..	112	..
Italy	44	..	46	..	47	..
Other countries	30	..	24	..	23	..
Total	1,488,604	100.0	1,324,734	100.0	1,262,582	100.0

*1929 figures subject to slight revision. Figures for previous years are final. †Production for fiscal year ended September 30, 1928. Calendar year 1928 production estimated at 87,800,000 bbls.

CRUDE PETROLEUM PRODUCED IN UNITED STATES IN 1929, BY FIELDS

(Thousands of barrels of 42 U. S. gallons)

	January	February	March	April	May	June	July	August	September	October	November	December	1929	1928*
Appalachian	2,583	2,350	2,635	2,709	2,886	2,664	3,021	2,914	2,839	3,201	2,937	3,018	33,757	31,059
Lima-Indiana	108	99	128	125	134	152	165	154	125	134	115	110	1,549	1,670
Michigan	159	130	145	158	231	478	623	650	510	505	393	372	4,354	594
Illinois and Southwest Indiana	589	534	678	532	628	586	630	645	601	642	584	567	7,216	7,425
Mid-Continent	48,760	44,488	48,115	46,707	49,714	48,406	53,319	53,549	50,112	49,175	45,382	47,024	584,751	553,125
Gulf Coast	4,253	3,840	4,350	4,535	4,612	4,326	4,505	4,780	4,659	5,209	5,224	5,281	55,574	46,591
Rocky Mountain	2,141	1,951	2,139	2,049	2,157	2,166	2,267	2,363	2,319	2,338	2,208	2,262	26,360	†29,199
California	23,386	22,301	24,325	23,295	24,053	24,625	26,797	27,233	26,104	26,895	21,318	21,705	292,037	231,811
Total	81,979	75,693	82,515	80,110	84,415	83,403	91,327	92,288	87,269	88,099	78,161	80,339	1,005,598	901,474
Classification by gravity (approx.):														
Light	74,812	67,743	73,713	71,799	76,009	75,390	82,878	83,407	78,509	79,178	69,409	71,264	904,111	805,534
Heavy	7,167	7,950	8,802	8,311	8,406	8,013	8,449	8,881	8,760	8,921	8,752	9,075	101,487	95,940

*Final figures. †Includes Alaska and Utah.

IMPORTS AND EXPORTS OF CRUDE PETROLEUM IN 1929, BY MONTHS*

(Thousands of barrels of 42 U. S. gallons)

	January	February	March	April	May	June	July	August	September	October	November	December	1929	1928†
Imports	8,075	7,016	6,790	7,828	7,552	6,591	6,122	5,800	6,953	5,766	4,535	5,887	78,915	79,767
From Venezuela	5,622	4,791	4,923	5,201	5,139	4,186	3,973	3,016	4,395	3,023	3,132	3,236	50,637	46,977
From Mexico	784	529	586	1,113	1,281	1,624	1,234	1,445	1,604	1,043	708	712	12,663	17,584
From Colombia	1,272	1,378	888	1,330	857	637	792	914	845	1,591	420	1,696	12,620	11,838
From other countries	397	318	393	184	275	144	123	425	109	109	275	243	2,995	3,368
Exports	1,972	1,678	1,572	1,726	1,932	2,615	3,117	2,236	1,988	2,869	2,580	2,089	26,374	18,966
Domestic oil:														
To Canada	1,507	1,354	1,249	1,279	1,729	2,248	2,872	1,922	1,782	2,428	2,223	1,657	22,250	15,431
To other countries	465	324	323	445	203	362	245	314	206	441	357	432	4,117	3,530
Shipments	.....	.....	.....	2	.....	5	.....	.....	.....	.....	.....	.....	7	4
Foreign oil	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
California crude oil‡	704	776	429	770	489	791	728	609	390	731	724	713	7,854	5,682

*From Bureau of Foreign and Domestic Commerce. †Final figures. ‡Included in total exports of domestic crude.

INDICATED DELIVERIES OF CRUDE PETROLEUM, EXCLUSIVE OF CALIFORNIA GRADES, TO DOMESTIC CONSUMERS, IN 1929, BY MONTHS

(Thousands of barrels of 42 U. S. gallons)

	January	February	March	April	May	June	July	August	September	October	November	December	1929	1928*
Domestic petroleum by field of origin:														
Appalachian	2,619	2,390	2,581	2,583	2,928	2,811	3,066	2,915	2,904	3,143	3,151	2,932	34,023	32,968
Lima-Indiana	155	129	219	140	259	236	203	249	233	193	198	43	2,167	1,649
Michigan	159	130	145	158	231	478	623	650	510	505	393	372	4,354	595
Illinois and Southwest Indiana	644	592	589	725	650	846	883	662	897	581	576	527	8,172	8,232
Mid-Continent	46,171	42,120	47,573	47,609	51,760	47,155	49,392	48,971	48,304	51,129	48,406	47,837	576,427	534,954
Gulf Coast	3,957	4,064	3,603	3,660	4,197	4,064	4,675	4,879	4,396	5,162	5,448	5,612	53,717	46,331
Rocky Mountain	2,394	2,080	2,316	2,359	2,327	2,317	2,250	2,226	1,993	2,408	2,257	2,355	27,182	†31,081
Deliveries and exports	56,099	51,505	57,026	57,234	62,352	57,907	61,092	60,552	59,227	63,121	60,339	59,578	706,042	655,750
Deliveries	54,831	50,603	55,883	56,280	60,909	56,088	58,703	58,925	57,639	60,983	58,483	58,202	687,529	642,466
Foreign petroleum	7,998	6,949	6,901	7,835	7,554	6,660	6,114	5,856	7,003	5,767	4,520	5,905	79,062	79,591
Deliveries of domestic and foreign petroleum	62,829	57,552	62,784	64,115	68,463	62,748	64,817	64,781	64,642	66,750	63,003	64,107	766,591	722,057

*Final figures. †Includes Alaska and Utah.

SHIPMENTS FROM CALIFORNIA TO EASTERN PORTS IN THE UNITED STATES IN 1929, BY MONTHS*

(Thousands of barrels of 42 U. S. gallons)

	January	February	March	April	May	June	July	August	September	October	November	December	1929	1928†
Crude oil	.....	241	155	.....	95	170	440	198	.....	.....	.....	.....	1,299	2,301
Refined products:														
Gasoline, naphtha, etc.	1,823	1,735	1,550	2,110	1,498	1,598	3,346	2,367	2,050	2,299	2,131	1,976	23,483	16,779
Tops	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	339
Kerosene	.....	.....	.....	.....	.....	.....	72	.....	.....	54	50	53	229	1
Gas oil	334	343	480	133	79	79	76	203	658	491	332	656	3,864	2,540
Fuel oil	.....	8	51	2	2	3	4	.....	3	28	3	75	179	818
Lubricants	2	2	1	1	1	71	1	71	9	12	.....	11	182	335
Asphalt	3	3	3	2	3	2	2	2	2	2	2	2	28	29
Total refined	2,162	2,091	2,085	2,248	1,583	1,753	2,501	2,643	2,722	2,886	2,518	2,773	27,965	20,835
Total all oils	2,162	2,332	2,240	2,248	1,678	1,923	2,941	2,841	2,722	2,886	2,518	2,773	29,264	23,136

*Compiled by the San Francisco office of the Bureau of Mines. †Final figures.

PRODUCTION AND STOCKS AT REFINERIES IN THE UNITED STATES, 1929

(Thousands of barrels of 42 U. S. gallons, except wax, coke, and asphalt)

	Runs to stills								Wax (thousands of pounds)	Coke (tons)	Asphalt (tons)	Other finished products	Unfinished oil produced (net)	Shortage
	Domestic crude	Foreign crude	Unfinished rerun (net)	Natural gasoline	Gasoline	Kerosene	Gas oil and fuel oil	Lubricants						
East Coast	106,187	66,247	13,610	2,473	57,851	8,091	91,011	10,874	260,156	181,600	1,586,200	1,463	1,864	6,818
Appalachian	33,802	.....	1,783	642	16,061	3,671	7,165	5,243	96,117	51,500	14,500	259	1,036	2,106
Indiana, Illinois, Kentucky, etc.	110,349	.....	8,911	2,636	65,102	5,334	36,296	3,901	59,482	439,000	534,100	2,155	2,158	1,637
Oklahoma, Kansas and Missouri	115,449	.....	5,093	4,248	62,432	10,052	38,439	2,678	40,618	362,900	23,400	709	2,671	5,513
Texas	208,820	2,873	9,364	9,749	93,589	13,336	92,448	7,727	67,165	440,700	219,900	157	9,171	10,778
Louisiana and Arkansas	69,031	6,397	2,644	6,731	31,092	5,501	32,114	968	65,266	144,800	407,500	2,625	7,105	2,351
Rocky Mountain	25,443	.....	7,165	1,492	16,431	1,530	6,950	580	41,270	124,900	10,300	264	6,715	629
California	243,110	.....	5,618	*17,492	91,682	9,639	143,471	2,388	.....	81,200	673,300	3,392	7,267	5,232
Total	912,191	75,517	54,188	45,463	434,241	57,154	447,894	34,359	630,074	1,806,600	3,469,200	9,924	37,987	35,064
Texas Gulf Coast	150,507	2,873	7,561	7,704	71,003	10,356	62,244	7,386	64,935	373,800	219,400	43	5,949	8,427
Louisiana Gulf Coast	44,254	6,397	626	5,196	22,818	4,829	17,480	822	65,266	142,700	360,600	2,448	4,289	897
January	72,399	6,426	4,431	3,230	34,335	4,700	36,838	2,945	58,885	137,900	188,400	661	2,513	2,542
February	65,952	6,079	4,410	3,026	31,264	4,435	34,331	2,503	50,027	126,700	208,200	617	2,373	2,059
March	74,094	6,614	3,282	3,738	34,467	4,515	37,456	2,943	56,372	129,400	227,500	738	2,873	2,602
April	73,799	6,660	4,553	3,602	34,636	4,434	37,533	2,899	57,976	130,700	282,600	763	2,997	2,910
May	77,216	7,204	4,405	3,668	36,270	4,902	38,570	3,005	53,783	141,900	315,100	994	3,391	2,701
June	77,109	7,291	4,382	3,548	35,606	4,928	37,338	2,928	52,714	153,800	326,900	1,114	4,333	3,283
July	79,506	6,413	4,575	3,805	37,855	4,406	37,980	2,936	46,171	157,900	386,000	1,097	3,580	3,328
August	80,443	6,290	5,937	4,225	38,510	5,111	39,011	3,143	53,377	168,900	378,700	976	3,444	3,545
September	78,108	5,991	4,168	4,098	37,152	4,667	37,468	2,852	44,513	161,200	364,700	784	3,223	3,213
October	82,722	5,668	4,440	4,609	39,663	5,379	38,974	2,885	56,377	172,300	355,600	749	3,510	3,190
November	75,363	5,698	4,910	3,921	37,350	4,829	36,134	2,555	50,775	155,000	247,600	692	3,114	2,870
December	75,480	5,183	4,695	3,993	37,133	4,848	36,261	2,765	49,104	170,900	187,900	699	2,736	2,821
Stocks end of month—	(†)		(‡)	(‡)			(††)							
January	35,419	7,099	38,564	.....	40,648	8,865	32,522	8,649	123,521	403,800	229,100	653	.....	.....
February	36,782	7,808	38,170	.....	45,704	8,210	30,118	8,534	140,053	388,100	235,600	652	.....	.....
March	37,169	9,088	38,471	.....	48,205	7,855	30,195	8,853	158,404	402,400	250,100	691	.....	.....
April	38,749	8,981	39,645	.....	47,015	7,497	33,404	8,527	170,687	441,900	248,800	735	.....	.....
May	39,912	8,646	40,305	.....	44,648	7,742	35,636	8,370	179,139	471,200	236,300	814	.....	.....
June	39,739	7,564	42,722	.....	41,991	8,348	37,332	7,869	188,764	498,400	247,100	750	.....	.....
July	41,274	6,837	42,440	.....	37,880	8,797	40,075	7,524	191,298	562,900	243,300	733	.....	.....
August	40,787	6,241	43,251	.....	35,788	8,689	39,316	7,478	190,878	608,000	246,800	742	.....	.....
September	39,137	5,968	43,375	.....	33,222	8,864	40,646	7,589	183,714	648,500	230,500	682	.....	.....
October	38,607	6,256	§45,965	.....	35,042	8,865	§38,717	8,021	189,094	672,100	227,400	687	.....	.....
November	38,907	5,328	45,623	.....	37,780	9,366	37,399	8,117	185,559	687,800	234,000	835	.....	.....
December	40,222	5,973	45,389	.....	43,115	9,039	34,425	8,269	187,990	692,500	240,300	1,156	.....	.....

*Includes 2,377,000 bbls. natural gasoline turned into pipe lines. †East of California. ‡Stocks of natural gasoline included in unfinished oil. §Approximately 2,500,000 bbls. transferred from gas oil and fuel oil to unfinished oils.

SUPPLY AND DEMAND OF ALL OILS IN 1929, BY MONTHS

(Including wax, coke and asphalt in thousands of barrels of 42 U. S. gallons)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1929	1928*
NEW SUPPLY:														
Domestic production:														
Crude petroleum	81,979	75,693	82,515	80,110	84,415	83,403	91,327	92,288	87,269	88,099	78,161	80,339	1,005,598	901,474
Daily average	2,644	2,703	2,662	2,670	2,723	2,780	2,946	2,977	2,909	2,842	2,605	2,592	2,755	2,463
Natural gasoline	3,983	3,736	4,324	4,264	4,343	4,250	4,417	4,507	4,574	4,912	4,504	4,457	52,271	42,326
Benzol	250	233	264	255	267	257	264	264	253	265	245	238	3,055	2,809
Total production	86,212	79,662	87,103	84,629	89,025	87,910	96,008	97,059	92,096	93,276	82,910	85,034	1,060,924	946,609
Daily average	2,781	2,845	2,810	2,821	2,872	2,930	3,097	3,131	3,070	3,009	2,764	2,743	2,907	2,586
Imports:†														
Crude petroleum	8,075	7,016	6,790	7,828	7,552	6,591	6,122	5,800	6,953	5,766	4,535	5,887	78,915	79,767
Refined products	884	908	1,489	2,634	2,732	2,426	3,176	3,429	2,725	3,642	3,347	2,402	29,794	11,790
Total new supply, all oils	95,171	87,586	95,382	95,091	99,309	96,927	105,306	106,288	101,774	102,684	90,792	93,323	1,169,633	1,038,166
Daily average	3,070	3,128	3,077	3,170	3,204	3,231	3,397	3,429	3,392	3,312	3,026	3,010	3,204	2,837
Increase in stocks, all oils	11,959	9,505	9,454	6,492	3,607	5,519	6,157	5,161	5,420	3,747	‡3,010	3,595	67,606	22,782
DEMAND:														
Total demand	83,212	78,081	85,928	88,599	95,702	91,408	99,149	101,127	96,354	98,937	93,802	89,728	1,102,027	1,015,384
Daily average	2,684	2,789	2,772	2,953	3,087	3,047	3,198	3,262	3,212	3,192	3,127	2,894	3,019	2,774
Exports:†														
Crude petroleum	1,972	1,678	1,572	1,726	1,932	2,615	3,117	2,236	1,988	2,869	2,580	2,089	26,374	13,966
Refined products	11,714	9,506	10,801	10,357	10,928	12,383	12,358	12,261	8,553	13,940	10,440	12,280	135,483	135,483
Domestic demand	69,526	66,897	73,555	76,516	82,842	76,410	83,674	86,270	85,811	82,128	80,782	75,359	939,770	860,935
Daily average	2,243	2,389	2,373	2,551	2,672	2,547	2,699	2,783	2,860	2,649	2,693	2,431	2,575	2,352
Excess of daily average domestic production over domestic demand	538	456	437	270	200	383	398	348	210	360	71	312	332	234
STOCKS (end of month):														
Crude petroleum:														
Pipe line, tank farm and refinery:														
East of California	372,913	376,939	379,659	380,706	379,542	379,089	383,343	386,677	386,663	384,502	380,393	381,391	381,391	374,871
California‖	119,101	122,958	126,422	128,902	132,670	136,901	140,270	146,298	150,759	153,811	152,944	153,135	153,135	115,914
Total crude	492,014	499,897	506,081	509,608	512,212	515,990	523,613	532,975	537,421	538,313	533,337	534,526	534,526	490,788
Natural gasoline at plants	741	821	995	1,166	1,396	1,356	1,156	893	661	490	514	604	604	607
Refined products	113,667	135,209	138,305	141,099	141,878	143,653	142,387	138,449	133,655	142,681	144,623	146,939	146,939	128,530
GRAND TOTAL STOCKS, ALL OILS	626,422	635,927	645,381	651,873	655,450	660,999	667,156	672,317	677,737	681,484	678,474	682,069	682,069	619,925
Days' supply ‖	233	228	233	221	212	217	209	206	211	213	217	236	226	223
Bunker oil (included above in domestic demand)	3,915	4,252	4,213	4,179	4,704	4,544	4,593	4,734	4,424	4,540	4,110	4,100	52,308	51,226

*1928 figures are final and include producers' stocks except for California. †From Bureau of Foreign and Domestic Commerce. Exports include shipments to Alaska, Hawaii and Porto Rico. ‡Decrease. §Includes fuel oil and producers' stocks (1929 only). ‖ Grand total stocks all oils divided by daily average total demand.

(Continued on next page)

ANTI-KNOCK

We selected Winkler County crude from all the others because of its high anti-knock content

We built this modern refinery especially to make anti-knock SILENCER GASOLINE

THAT'S WHY WE ARE KNOWN AS ANTI-KNOCK SPECIALISTS

BURFORD OIL COMPANY

General Sales Office, TULSA TRUST BLDG., TULSA, OKLA.

Refinery, PECOS, TEXAS
Branch Sales Offices, Phoenix, Ariz., MINNEAPOLIS, MINNESOTA

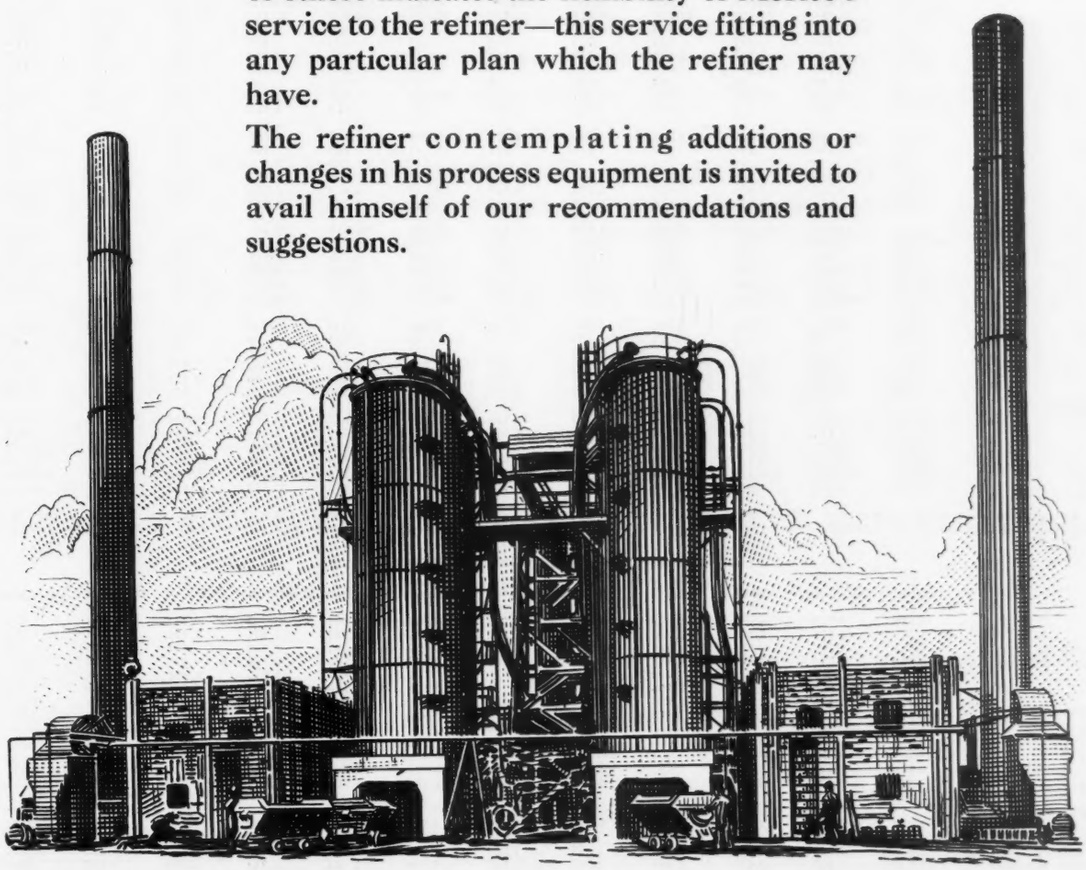
McKEE CONSTRUCTION

THESE Dubbs Units were constructed from the designs of the Licensor for the Licensee.

Our experience in the construction of refinery equipment enables us to undertake construction of intricate and difficult work from the designs of others and to execute such contracts in a workmanlike manner within a a reasonable time.

The construction of equipment to the designs of others indicates the flexibility of McKee's service to the refiner—this service fitting into any particular plan which the refiner may have.

The refiner contemplating additions or changes in his process equipment is invited to avail himself of our recommendations and suggestions.



ARTHUR G. McKEE & CO.
Engineers & Contractors
2422 EUCLID AVE. CLEVELAND, O., U.S.A.

NATURAL GASOLINE AND MOTOR FUEL IN THE UNITED STATES IN 1929, BY MONTHS, IN MILLIONS OF GALLONS

Natural gasoline:	January	February	March	April	May	June	July	August	September	October	November	December	1929	1928†
Production by fields—														
Appalachian	11.4	10.9	9.3	8.2	8.0	6.3	5.9	6.3	6.7	8.9	9.4	10.3	101.6	99.7
Kentucky, Illinois, etc.	1.4	1.2	1.2	1.2	1.2	.9	.9	.9	.9	1.3	1.3	1.4	13.8	14.2
Oklahoma	55.1	47.5	57.0	57.0	58.6	57.4	57.6	57.5	59.2	59.4	55.6	54.6	676.5	616.3
Seminole	26.4	23.4	28.2	29.1	30.3	30.9	31.0	30.9	31.7	30.4	27.4	25.2	344.9	247.5
Osage County	7.1	6.0	7.8	7.3	6.7	6.4	6.6	7.0	6.9	7.6	7.8	7.3	84.5	98.7
Rest of State	21.6	18.1	21.0	20.6	21.6	20.1	20.0	19.6	20.6	21.4	20.4	22.1	247.1	270.1
Kansas	3.1	2.8	2.9	3.0	3.0	2.6	2.5	2.5	2.7	2.8	3.1	2.8	33.8	35.7
Texas	31.2	29.8	33.9	33.4	34.1	32.5	33.2	35.3	37.3	40.7	40.9	40.0	422.3	331.0
Panhandle	12.2	11.5	13.3	13.3	13.4	12.8	13.5	15.8	17.8	19.3	20.8	20.1	183.8	112.5
North Texas	3.9	3.9	4.6	4.2	4.2	3.9	3.9	3.7	3.8	3.9	4.2	4.2	48.4	44.3
West Central	13.5	12.1	12.8	12.6	12.9	12.2	12.1	12.2	12.2	13.8	12.6	12.3	151.3	156.7
Rest of State	1.6	2.3	3.2	3.3	3.6	3.6	3.7	3.6	3.5	3.7	3.3	3.4	38.8	16.9
Louisiana	5.1	4.9	5.1	4.7	4.9	4.8	4.9	5.1	5.2	6.3	6.1	6.3	63.4	55.5
Arkansas	2.7	2.4	2.7	2.7	2.7	2.6	2.7	2.8	2.8	2.9	2.7	2.6	32.3	32.5
Rocky Mountain	3.3	3.2	3.7	4.0	4.3	4.1	4.0	4.2	4.3	4.4	3.9	4.1	47.5	45.9
California	54.0	54.2	65.8	64.9	65.6	67.3	73.8	74.7	73.0	79.6	66.2	65.1	804.2	546.9
Long Beach	18.4	18.4	20.9	20.4	19.5	19.2	20.5	20.2	19.3	20.1	15.8	15.1	227.8	177.1
Ventura Avenue	6.0	5.5	6.3	6.2	6.5	6.8	6.7	7.0	6.8	7.1	6.3	5.4	76.6	65.5
Seal Beach	2.7	2.7	3.4	3.8	3.7	3.5	3.9	3.9	2.8	4.3	3.3	3.3	41.3	30.9
Huntington Beach	3.8	3.4	3.0	3.4	3.4	3.4	3.5	3.6	3.4	3.7	3.6	3.7	41.9	50.1
Santa Fe Springs	9.0	11.0	16.4	15.5	16.6	19.3	22.7	23.4	24.7	26.2	18.3	19.2	222.3	39.6
Rest of State	14.1	13.2	15.8	15.6	15.9	15.1	16.5	16.6	16.0	18.2	18.9	18.4	194.3	183.7
Total United States	167.3	156.9	181.6	179.1	182.4	178.5	185.5	189.3	192.1	206.3	189.2	187.2	2,195.4	1,777.7
Daily average	5.4	5.6	5.9	6.0	5.9	6.0	6.0	6.0	6.4	6.7	6.3	6.2	6.0	4.9
Stocks at end of period	31.1	34.5	41.8	49.0	58.4	57.0	48.5	37.5	27.8	20.6	21.6	25.4	25.4	25.5
Indicated deliveries	161.7	153.5	174.3	171.9	173.0	179.9	194.0	200.3	201.8	213.5	188.2	183.4	2,195.5	1,783.0
Blending at plants:														
Natural gasoline used*	2.3	1.8	2.0	2.5	2.7	2.6	2.9	2.7	2.5	2.0	1.9	1.8	27.7	26.7
Naphtha used*	2.6	2.2	2.4	3.2	3.4	3.0	3.0	2.9	2.7	2.4	2.5	2.0	32.3	34.3
Stocks of blends end of period	.9	1.0	.8	1.0	1.0	1.1	1.1	1.0	1.0	.9	.7	.7	.7	1.1
Indicated output of motor fuel:														
Gasoline produced at refineries	1,442.1	1,313.1	1,447.6	1,454.7	1,523.3	1,495.5	1,589.9	1,617.4	1,560.4	1,665.8	1,568.7	1,559.6	18,238.1	15,831.7
Natural gasoline blended at plants*	2.3	1.8	2.0	2.5	2.7	2.6	2.9	2.7	2.5	2.0	1.9	1.8	27.7	26.7
Natural gasoline sold to jobbers (est.)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	25.2	25.2
Benzol produced‡	10.5	9.8	11.1	10.7	11.2	10.8	11.1	11.1	10.6	11.1	10.3	19.0	128.3	118.0
Total United States	1,457.0	1,326.8	1,462.8	1,470.0	1,539.3	1,511.0	1,606.0	1,633.3	1,575.6	1,681.0	1,583.0	1,573.5	18,419.3	16,001.6
Daily average	47.0	47.4	47.2	49.0	49.7	50.4	51.8	52.7	52.5	54.2	52.8	50.8	50.5	43.7

*Exclusive of California. †Estimated with production of by-product coke as a basis.

COMPARATIVE ANALYSES OF THE MAJOR REFINED PRODUCTS IN 1929, BY MONTHS

(Thousands of barrels of 42 U. S. gallons, except for wax)

Gasoline:	January	February	March	April	May	June	July	August	September	October	November	December	1929	1928
Production	34,335	31,264	34,467	34,636	36,270	35,606	37,855	38,510	37,152	39,663	37,350	37,133	434,241	376,945
Daily average	1,108	1,117	1,112	1,155	1,170	1,187	1,221	1,242	1,238	1,279	1,245	1,198	1,190	1,030
Imports*	499	406	327	822	729	732	934	792	901	1,026	984	716	8,868	4,198
Exports*	4,650	3,838	4,798	4,629	5,249	5,832	6,040	5,635	4,426	6,053	4,094	5,964	61,208	52,904
Stocks	40,648	45,704	48,205	47,015	44,648	41,991	37,880	33,788	33,222	35,042	37,780	43,115	43,115	33,066
Days' supply†	46	48	46	38	35	32	27	24	26	28	32	41	36	32
Domestic demand	22,602	22,776	27,495	32,019	34,117	33,163	36,860	37,759	34,193	32,816	31,502	26,550	371,852	328,489
Daily average	729	813	887	1,067	1,101	1,105	1,189	1,218	1,140	1,059	1,050	856	1,019	898
Kerosene:														
Production	4,700	4,435	4,515	4,434	4,902	4,928	4,406	5,111	4,667	5,379	4,829	4,348	57,154	59,353
Daily average	152	158	146	148	158	164	142	165	156	174	161	156	157	162
Imports*	38	20	5	21	6	15	15	24	...	10	34	20	208	202
Exports*	1,913	1,591	1,899	1,657	1,463	1,790	1,288	2,054	1,105	2,252	1,319	1,682	20,018	22,034
Stocks	8,865	8,210	7,855	7,497	7,742	8,348	8,797	8,689	8,864	8,865	9,366	9,039	9,039	9,001
Domestic demand	2,956	3,519	2,976	3,156	3,200	2,547	2,684	3,189	3,387	3,136	3,043	3,513	37,306	36,235
Gas oil and fuel oil:														
Production	36,838	34,331	37,456	37,533	38,570	37,338	37,980	39,011	37,468	38,974	36,134	36,261	447,894	427,237
Daily average	1,188	1,226	1,208	1,251	1,244	1,245	1,225	1,258	1,249	1,257	1,205	1,170	1,227	1,167
Imports*	335	466	1,146	1,778	1,983	1,660	2,206	2,589	1,811	2,589	2,297	1,650	20,510	7,268
Exports*	3,699	2,795	2,600	2,892	3,100	3,375	3,531	3,379	1,953	4,057	4,098	3,294	39,073	44,427
Stocks‡	32,522	30,118	30,195	33,404	35,636	37,332	40,075	39,316	40,646	§38,717	37,399	34,425	34,425	34,926
Stocks‖	131,513	130,001	131,450	134,532	137,855	141,064	145,762	147,761	150,778	150,122	148,418	146,511	146,511	134,144
Lubricants:														
Production	2,945	2,503	2,943	2,899	3,005	2,928	2,936	3,142	2,852	2,885	2,555	2,765	34,359	34,658
Daily average	95	89	95	97	97	98	95	101	95	93	85	89	94	95
Imports*	1	4	2	3	4	6	4	5	3	2	3	2	39	13
Exports*	1,116	871	1,045	786	844	989	1,118	926	690	1,077	604	899	10,965	11,023
Stocks	8,649	8,534	8,853	8,527	8,370	7,869	7,524	7,478	7,589	8,021	8,117	8,269	8,269	8,340
Domestic demand	1,521	1,751	1,581	2,442	2,322	2,446	2,167	2,268	2,054	1,378	1,858	1,716	23,504	23,168
Wax (thousands of pounds):														
Production	58,885	50,027	56,372	57,976	53,783	52,714	46,171	53,377	44,513	56,377	50,775	49,104	630,074	630,144
Daily average	1,900	1,787	1,818	1,933	1,735	1,757	1,489	1,722	1,484	1,819	1,693	1,584	1,726	1,722
Imports*	2,982	3,120	2,575	2,680	2,748	3,070	4,606	5,433	2,896	3,943	2,609	3,860	40,522	24,741
Exports*	28,065	25,359	22,127	22,664	18,662	24,986	24,445	28,114	31,990	39,037	26,685	26,254	318,488	392,705
Stocks	123,521	140,053	158,404	170,687	179,139	188,764	191,298	190,878	183,714	189,094	185,559	187,990	187,990	110,344
Domestic demand	20,625	11,256	18,469	25,709	29,417	21,173	23,798	31,116	22,583	15,903	30,234	24,179	274,462	302,474

*From Bureau of Foreign and Domestic Commerce. Exports include shipments to Alaska, Hawaii and Porto Rico. †Stocks divided by daily average domestic demand plus exports. ‡East of California. §Approximately 2,500,000 bbls. gas oil and fuel oil transferred to unfinished oils. ‖Total gas oil and fuel oil stocks plus heavy crude in California.

GASOLINE STATISTICS IN 1929, BY MONTHS

(Thousands of barrels of 42 U. S. gallons)

	January	February	March	April	May	June	July	August	September	October	November	December	1929	1928
Total production:														
East Coast	4,712	4,921	4,351	4,505	4,797	4,735	4,553	5,001	4,944	5,195	5,284	5,479	57,851	53,694
Appalachian	1,380	1,178	1,335	1,346	1,418	1,387	1,377	1,294	1,301	1,405	1,346	1,294	16,061	15,894
Indiana, Illinois, Kentucky, etc.	4,983	4,594	4,953	5,090	5,464	5,518	5,857	6,097	5,649	5,853	5,471	5,573	65,102	55,716
Oklahoma, Kansas and Missouri	5,024	4,533	5,026	4,981	5,229	5,266	5,554	5,549	5,296	5,435	5,312	5,227	62,432	60,943
Texas	7,409	7,208	7,341	7,458	7,903	7,381	7,773	7,875	8,066	8,904	8,280	7,991	93,589	80,863
Louisiana-Arkansas	2,450	2,270	2,621	2,508	2,697	2,577	2,523	2,630	2,544	2,814	2,650	2,809	31,093	26,652
Rocky Mountain	1,379	1,215	1,424	1,436	1,477	1,406	1,399	1,447	1,405	1,365	1,228	1,250	16,431	16,497
California	6,998	5,975	7,416	7,312	7,286	7,336	8,819	8,617	7,947	8,688	7,779	7,510	91,682	66,676
Total	34,335	31,264	34,467	34,636	36,270	35,606	37,855	38,510	37,152	39,663	37,350	37,133	434,241	376,945
Texas Gulf Coast	5,743	5,641	5,624	5,607	5,888	5,402	5,872	5,962	6,158	6,829	6,257	2,020	71,003	62,526
Louisiana Gulf Coast	1,845	1,747	1,962	1,893	1,950	1,872	1,800	1,903	1,818	2,023	1,880	2,125	22,818	20,199
Production by cracking:														
East Coast	1,904	1,718	1,664	1,811	2,011	2,060	2,190	2,320	2,363	2,508	2,539	2,702	25,790	21,790
Appalachian	417	386	424	412	459	455	503	483	466	455	466	464	5,390	4,579
Indiana, Illinois, Kentucky, etc.	2,078	1,966	2,037	2,097	2,325	2,364	2,462	2,539	2,401	2,424	2,299	2,357	27,348	23,279
Oklahoma, Kansas and Missouri	1,721	1,457	1,658	1,660	1,761	1,707	1,910	1,822	1,815	1,835	1,795	1,844	20,985	19,758
Texas	2,750	2,513	2,484	2,491	2,859	2,943	2,846	3,037	3,156	3,442	3,381	3,579	35,481	30,849
Louisiana-Arkansas	737	656	643	677	773	845	926	989	924	981	983	912	10,046	8,141
Rocky Mountain	585	528	613	649	641	621	583	648	629	571	537	597	7,112	6,780
California	855	769	877	847	894	888	881	982	1,049	1,136	1,163	1,266	11,607	7,378
Total	11,047	9,992	10,400	10,644	11,723	11,883	12,301	12,820	12,803	13,352	13,163	13,631	143,759	122,554
Texas-Louisiana Gulf Coast	2,968	2,760	2,687	2,714	3,055	3,164	3,207	3,411	3,466	3,665	3,586	3,678	38,361	33,587
Per cent produced by cracking	32	32	30	31	32	33	32	33	34	34	35	37	33	33
Stocks end of period:														
East Coast	6,364	7,209	7,541	7,525	7,218	6,327	4,861	4,382	4,112	4,512	5,055	6,063	6,063	5,537
Appalachian	1,605	1,870	2,007	1,850	1,698	1,522	1,300	1,056	1,066	995	1,153	1,383	1,383	1,229
Indiana, Illinois, Kentucky, etc.	6,793	8,124	8,415	7,862	7,113	6,586	5,665	4,780	4,375	4,333	4,488	5,634	5,634	5,099
Oklahoma, Kansas and Missouri	4,830	5,743	5,849	5,622	5,382	5,205	4,336	3,257	2,937	2,782	3,249	4,123	4,123	3,691
Texas	6,094	7,011	7,308	6,933	6,565	5,638	4,995	3,864	4,087	4,880	5,771	6,648	6,648	4,863
Louisiana-Arkansas	2,772	3,061	3,119	2,575	2,368	2,319	2,022	1,761	1,684	1,598	1,664	2,145	2,145	2,158
Rocky Mountain	2,056	2,500	2,673	2,625	2,460	2,494	2,318	1,812	1,843	1,717	1,917	2,334	2,334	1,568
California	10,134	10,186	11,293	12,023	11,839	11,900	12,383	12,876	13,118	14,225	14,483	14,785	14,785	8,921
Total	40,648	45,704	48,205	47,015	44,648	41,991	37,880	33,788	33,222	35,042	37,780	43,115	43,115	33,066
Texas Gulf Coast	5,280	6,051	6,322	5,915	5,576	4,532	3,906	2,907	3,120	3,982	4,589	5,313	5,313	4,063
Louisiana Gulf Coast	2,524	2,761	2,848	2,318	2,061	1,999	1,739	1,447	1,397	1,295	1,411	1,838	1,838	1,979

WELLS DRILLED FOR OIL AND GAS IN THE UNITED STATES IN 1929, BY MONTHS*

	January	February	March	April	May	June	July	August	September	October	November	December	1929†	1928†
Oil	1,111	1,090	1,081	1,216	1,200	1,318	1,426	1,669	1,438	1,556	1,407	1,060	15,572	12,526
Gas	191	186	199	230	231	218	263	252	237	258	300	305	2,870	2,727
Dry	557	557	598	717	665	623	722	741	680	701	743	610	7,914	7,078
Total	1,859	1,833	1,878	2,163	2,096	2,159	2,411	2,662	2,355	2,515	2,450	1,975	26,356	22,331

*For states east of California, from The Oil and Gas Journal; for California, from the American Petroleum Institute. †Final figures.

PRODUCTION OF CRUDE PETROLEUM IN 1929 BY STATES

(Petroleum transported from producing properties. Thousands of barrels of 42 U. S. gallons)

Final figures will include petroleum consumed on the leases and produced but not transported from producing properties, which items for 1929 may amount to 2,000,000 bbls.

	January	February	March	April	May	June	July	August	September	October	November	December	1929	1928*
Arkansas	2,324	2,145	2,341	2,233	2,230	2,044	2,098	2,056	1,953	1,971	1,806	1,875	25,076	32,096
California	23,386	22,301	24,325	23,295	24,053	24,625	26,797	27,233	26,104	26,895	21,318	21,705	292,037	231,811
Colorado	214	185	205	187	221	215	215	189	182	168	151	166	2,298	2,774
Illinois	506	453	602	456	550	515	559	571	531	565	506	490	6,304	6,462
Indiana	87	85	82	82	84	78	77	80	75	82	83	82	977	1,052
Southwestern	83	81	76	76	78	71	71	74	70	77	78	77	912	963
Northeastern	4	4	6	6	6	7	6	6	5	5	5	5	65	89
Kansas	2,929	2,836	3,086	3,379	3,793	3,791	4,329	4,186	3,959	3,677	3,433	3,477	42,875	38,596
Kentucky	586	511	559	583	635	546	710	678	722	810	725	711	7,776	7,359
Louisiana	1,776	1,514	1,666	1,624	1,632	1,590	1,656	1,668	1,780	1,893	1,656	1,774	20,229	21,847
Gulf Coast	723	541	584	578	567	557	567	594	636	694	592	602	7,235	7,053
Rest of State	1,053	973	1,082	1,046	1,065	1,033	1,089	1,074	1,144	1,199	1,064	1,172	12,994	14,794
Michigan	159	130	145	158	231	478	623	650	510	505	393	372	4,354	594
Montana	306	275	282	260	272	262	264	265	255	262	243	237	3,183	4,015
New Mexico	76	67	91	78	96	86	107	145	216	241	238	248	1,689	943
New York	255	240	267	277	289	282	301	285	282	289	281	298	3,346	2,603
Ohio	532	482	547	560	579	573	647	577	541	596	532	542	6,708	7,015
Central and Eastern	428	387	425	441	451	428	488	429	421	467	422	437	5,224	5,434
Northwestern	104	95	122	119	128	145	159	148	120	129	110	105	1,484	1,581
Oklahoma	22,884	20,070	21,133	20,586	21,743	20,688	22,682	22,632	21,372	20,669	19,120	20,125	253,704	249,857
Osage	1,399	1,240	1,319	1,277	1,296	1,192	1,283	1,255	1,178	1,214	1,137	1,159	14,949	19,667
Seminole†	12,840	11,438	12,325	11,869	12,568	12,262	13,134	13,050	12,138	11,004	9,790	9,627	142,045	111,288
Rest of State	8,645	7,392	7,489	7,440	7,879	7,234	8,265	8,327	8,056	8,451	8,193	9,339	96,710	118,902
Pennsylvania	850	806	916	939	1,018	954	1,037	1,042	959	1,121	1,053	1,110	11,805	9,956
Tennessee	2	2	1	3	2	1	2	2	1	2	1	.....	19	46
Texas	23,100	21,763	24,239	23,420	24,928	24,619	27,059	27,787	25,707	26,174	24,591	25,054	298,441	257,320
Gulf Coast	3,530	3,299	3,766	3,957	4,045	3,769	3,938	4,186	4,023	4,515	4,632	4,679	48,339	39,538
West Texas	11,489	10,915	11,942	10,942	11,671	11,335	12,676	12,218	11,279	11,369	10,652	10,494	136,982	123,540
Rest of State	8,081	7,549	8,531	8,521	9,212	9,515	10,445	11,383	10,405	10,290	9,307	9,881	113,120	94,242
West Virginia	462	404	467	466	491	453	483	478	454	512	455	462	5,587	5,661
Wyoming	1,545	1,424	1,561	1,524	1,568	1,603	1,681	1,764	1,666	1,667	1,576	1,611	19,190	21,461
Salt Creek	916	903	957	945	928	913	938	1,022	972	992	930	944	11,360	14,023
Rest of State	629	521	604	579	640	630	743	742	694	675	646	667	7,830	7,438
Total	81,979	75,693	82,515	80,110	84,415	83,403	91,327	92,288	87,269	88,099	78,161	80,339	1,005,598	901,474
Daily average	2,645	2,703	2,662	2,670	2,723	2,780	2,946	2,977	2,909	2,842	2,605	2,592	2,755	2,463

*Final figures. Includes 6,000 bbls. produced in Alaska and Utah. †1929 figures includes St. Louis-Pearson-Maud.

STOCKS OF CRUDE PETROLEUM HELD IN THE UNITED STATES IN 1929, BY MONTHS

(Thousands of barrels of 42 U. S. gallons)

EAST OF CALIFORNIA:	Jan. 31, 1929	Feb. 28	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31, 1929	Dec. 31, 1928*
At refineries: By location of storage:													
East Coast: Domestic	8,340	9,129	9,050	9,442	9,367	8,202	9,292	9,221	8,899	8,940	8,695	8,955	8,496
Foreign	5,072	5,690	6,380	6,313	6,484	5,382	4,910	4,370	3,748	4,067	3,208	3,989	4,306
Appalachian	2,256	2,358	2,496	2,493	2,645	2,591	2,723	2,697	2,803	2,830	2,952	2,953	2,183
Indiana, Illinois, Kentucky, etc.	2,856	2,839	2,930	2,932	2,974	2,945	3,119	2,834	2,809	2,859	3,199	3,305	2,939
Oklahoma, Kansas and Missouri	6,001	5,982	5,920	6,059	6,034	6,216	6,271	6,475	5,369	5,305	5,372	5,610	5,530
Texas: Inland	2,166	1,855	1,952	2,150	2,464	2,578	1,753	1,716	1,745	1,798	1,702	2,034	2,184
Gulf Coast: Domestic	8,130	8,190	8,417	9,016	9,492	9,802	10,512	10,461	10,438	10,144	10,519	10,749	7,206
Foreign	310	273	392	598	344	533	397	372	557	615	585	485	207
Arkansas and Inland Louisiana	841	1,260	1,310	1,223	1,470	1,402	1,511	1,468	1,347	1,183	1,046	1,050	758
Louisiana Gulf Coast: Domestic	2,731	3,103	2,986	3,311	3,391	3,975	4,160	4,104	4,384	4,122	3,910	3,930	3,315
Foreign	1,717	1,845	2,316	2,070	1,818	1,649	1,530	1,469	1,663	1,574	1,535	1,499	1,359
Rocky Mountain	2,098	2,066	2,108	2,123	2,075	2,028	1,933	1,811	1,343	1,426	1,512	1,636	2,046
Total	42,518	44,590	46,257	47,730	48,558	47,303	48,111	46,998	45,105	44,863	44,235	46,195	40,529
Pipe-line and tank-farm stocks (net):													
Domestic. By field of origin:													
N. Y., Pa., W. Va., East and Cent. Ohio	4,671	4,624	4,695	4,745	4,711	4,652	4,551	4,578	4,555	4,572	4,473	4,675	4,751
Kentucky	808	815	798	874	866	778	834	806	764	805	690	574	764
Lima-Indiana	1,115	1,085	994	979	854	770	732	637	529	470	477	544	1,162
Illinois-Southwest Indiana	11,312	11,254	11,343	11,150	11,128	10,868	10,616	10,598	10,302	10,363	10,371	10,411	11,367
Oklahoma, Kansas, Panhandle, Central North and West Texas	241,984	244,863	246,035	245,478	245,021	246,402	250,403	255,199	257,611	256,147	253,425	252,504	239,345
Northern Louisiana and Arkansas	26,353	25,842	25,212	24,867	23,278	23,148	23,074	22,856	22,252	21,762	21,460	21,568	26,403
Gulf Coast	18,568	18,344	19,091	19,966	20,381	20,463	20,473	20,374	20,637	20,684	20,460	20,129	18,272
Rocky Mountain	25,248	25,119	24,942	24,632	24,462	24,311	24,328	24,465	24,791	24,721	24,672	24,679	25,501
Total	330,059	331,946	333,110	332,691	330,701	331,572	335,010	339,513	341,441	339,524	336,028	335,084	327,565
Foreign: Atlantic Coast	69	83	59	94	110	60	85	67	45	71	105	80	49
Gulf Coast	267	320	233	191	173	154	137	99	71	44	25	32	210
Total	336	403	292	285	283	214	222	166	116	115	130	112	259
Total stocks east of California†	372,913	376,939	379,659	380,706	379,542	379,089	383,343	386,677	386,662	384,502	380,393	381,391	368,353
CLASSIFICATION BY GRAVITY (approx.):													
East of California:†													
Light crude (24° and above)	322,749	325,766	329,634	331,301	332,011	333,102	339,438	344,701	345,673	344,181	341,446	342,049	319,928
Heavy crude (below 24°)	50,164	51,173	50,025	49,405	47,531	45,987	43,905	41,976	40,989	40,321	38,947	39,342	48,425
California:‡ Light (20° and above)	20,110	23,075	25,167	27,774	30,451	33,169	34,583	37,853	40,627	42,406	41,925	41,049	17,755
Heavy (inc. fuel oil)	98,991	99,883	101,255	101,128	102,219	103,732	105,687	108,445	110,132	111,405	111,019	112,086	99,218
PRODUCERS' STOCKS EAST OF CALIFORNIA (not included above; approx.)	6,600	6,500	6,500	6,500	6,700	6,700	6,550	6,450	6,450	6,250	6,150	6,050	6,521

*Final figures. †Exclusive of producers' stocks. ‡Includes producers' stocks.

PERMIT POLICY TEST NOW BEFORE COURTS

By Charles E. Kern

Washington Bureau, The Oil and Gas Journal

WASHINGTON, D. C., Mar. 3.—In the supreme court of the District of Columbia arguments were heard on the question of the legality of President Hoover's policy announced a year ago for the conservation of oil by rejecting application for permits for exploration and exploitation for oil and gas on the public domain. Two cases were involved, one a writ of mandamus to compel the Secretary of the Interior, Ray Lyman Wilbur, to reinstate a rejected application and the other to compel him to accept an oil and gas application for a prospecting permit. These cases are entitled Barton against Wilbur and Vedder against Wilbur.

Extended arguments were submitted at the conclusion of which Justice Bailey stated that as undoubtedly there should be an appeal he hoped to give his decision from the bench. However, at the request of government counsel decision was reserved pending filing of briefs.

Justice Bailey particularly requested counsel for the government to cite authorities relative to the power of the Secretary of the Interior to withdraw public lands from entry or development without specific authority of Congress or the President. When he was advised that government counsel would support the authority of the Secretary of the Interior by citations of authorities, Justice Bailey remarked that without such cases his present view would be that the writs should issue.

"The mere statement of the President's policy" said Justice Bailey "is not an order or authority." Justice Bailey pointed out that from the evidence apparently no formal order had been given by the President authorizing the Secretary of the Interior to reject all pending applications, and those to be filed in the future. It seemed to him the policy of the administration tended to thwart rather than advance the purpose of the leasing act of 1920 under which the applications were filed. He thought such action was directly opposite to the purpose of the act.

It was shown that in this case the President in an undertaking to carry out his conservation policy gave no written order to the Secretary of the Interior, signed by him and attested by the Department of State as in the case of proclamations and counsel for the government declared that no such formality was necessary. Justice Bailey pointed out that in the so-called Mid-West cases a proclamation had been issued by the President, withdrawing the public lands in question from entry, but he had not followed that course in the instant cases.

Careful Welding
Assures Uniformly
Strong Pipe
The significance of consistently sound welds in every length of Republic Steel Pipe cannot be over-emphasized . . . for sound welds assure uniform strength, and are the backbone of reliable pipe service. Welds that do not open when the pipe is threaded. Welds that hold together when pressure is exerted either from inside or outside. Tight, strong, solidly closed welds that mean safe, leak-proof piping and lasting, trouble-free service. This is a certainty when Republic Steel Pipe is used.
REPUBLIC
IRON & STEEL CO. YOUNGSTOWN O.
STEEL PIPE

GULF COAST FIELDS AND WILDCATS

(Continued from Page 74)

Humble & Valley's No. 7 Thompson ..... Derrick.
Humble & Valley's No. 7 Urban ..... Shut down 1,165 ft.
Humble & Valley's No. 7-A Walton ..... Drlg. sand and boulders 2,600 ft.
Humble & Valley's No. 3-A Washington ..... Abandoned 3,464 ft.
Humble & Valley's No. 4 Woodley ..... Drlg. shale and sand 2,356 ft.
Humble & Valley's No. 5 Woodley ..... Comp. flowing 480 bbls. 3,446 ft.
Humble & Valley's No. 6 Woodley ..... Bldg. derrick.

DE WALT—FORT BEND COUNTY

Humble Oil & Ref. Co.'s No. 3-B Bankers Mortgage ..... Drlg. sticky shale 1,223 ft.
Humble Oil & Refg. Co.'s No. 13 Brazos ..... Derrick.
Humble Oil & Refg. Co.'s No. 14 Brazos ..... Rig.
Humble Oil & Ref. Co.'s No. 9 Hamner fee ..... Location.
Humble Oil & Ref. Co.'s No. 13 Sugarland ..... Rig.
Humble Oil & Ref. Co.'s No. 3-B Sugarland ..... Comp. flowing 560 bbls. 3,784 ft.
Humble Oil & Ref. Co.'s No. 9 Nelson ..... Drlg. shale and lime 1,835 ft.

HUMBLE—HARRIS COUNTY

Hammell Drlg. Co.'s No. 1 Allo ..... Location.
Houtex Oil Co.'s No. 1 O'Boyle, west ..... Rig.
Humble Oil & Refining Co.'s No. 11 Williams, south ..... Location.
M. LaRue's No. 1 Cicero ..... Rig.
Rio Bravo Oil Co.'s No. 1 fee, west ..... Drlg. sand 1,746 ft.
South Texas Petroleum Co.'s No. 14 Morris, south ..... Drlg. sticky shale 4,798 ft.
South Texas Petroleum Co.'s No. 3 Lee ..... Failed to flow, running tubing 5,133 ft.
South Texas Petroleum Co.'s No. 4 Lee, south ..... Location.
Cullen & West's No. 2 Burt, east ..... Drlg. sticky shale 3,080 ft.
Sun Oil Co.'s No. 4 Bender, west ..... Drlg. shale and lime 2,525 ft.
The Texas Company's No. 1 Atlantic & Gulf, southeast .. Drlg. sand and shale 3,649 ft.
The Texas Company's No. 36 Kohler, northeast ..... Set 400 ft. screen 4,777 ft.; flowing 5,000 bbls. daily on ⅝-in. choke.
The Texas Company's No. 24 House, north ..... Drlg. gumbo 1,667 ft.

BLUE RIDGE—FORT BEND COUNTY

Humphreys Corp.'s No. 1 West-Schenck (workover) ..... Drilling.
Sinclair Oil & Gas Co.'s No. 1 Blakely ..... Drlg. gumbo and boulders 1,125 ft.
Sinclair Oil & Gas Co.'s No. 4 Blakely (workover) ..... Rigging up to deepen.

PIERCE JUNCTION—HARRIS COUNTY

Anderson & Plummer's No. 6 Whitehead (workover) .... No report.
Marland Oil Co.'s No. 2 Prudential (workover) ..... No report.
Navarro Oil Co. and Texas Exploration Co.'s No. 18 Dooley ..... Drlg. sand showing oil 4,040 ft.
Pure Oil Co.'s No. 1 Herman (workover) ..... Swabbed salt water 4,981 ft.; standing.
Pure Oil Co.'s No. 2 Herman, southwest ..... Drlg. sticky shale and lime 3,150 ft.
Rio Bravo Oil Co.'s No. 13-A Settegast (workover) ..... Cleaning hole to deepen.
Rio Bravo Oil Co.'s No. 18-A Settegast, west ..... Derrick.
Saxet Gas Co.'s No. 6 Herman, southwest ..... Standing.
Saxet Gas Co.'s No. 7 Herman, southwest ..... Derrick.
Superior Oil Co.'s No. 3-A Whitehead ..... Rigging up to pump 4,228 ft.

LIBERTY—LIBERTY COUNTY

Empire Gas & Fuel Co.'s No. 11 Groggan ..... No report.
The Texas Company's No. 6 Green, northwest ..... Rig.

HULL—LIBERTY COUNTY

W. B. Flynn's No. 8 Harrison (workover) ..... No report.
Empire Gas & Fuel Co.'s No. 31 Barngrover ..... Rig.
Ocean Springs Oil Co.'s No. 1-H Palmer ..... No report.
Republic Production Co.'s No. 57 Dolbear (workover) .... No report.
Republic Production Co.'s No. 122 Dolbear ..... No report.
The Texas Company's No. 1 Barrow fee ..... Derrick.
The Texas Company's No. 8 Hannah-Vacuum ..... Drlg. sand and shale 4,783 ft.

BIG CREEK—FORT BEND COUNTY

Benedum & Trees' No. 1 J. F. Ahlers ..... Derrick.
Benedum & Trees' No. 1 Moore ..... Heaving shale 4,179 ft.; trying to set 6⅝-in. casing.
Navarro Oil Co.'s No. 4 Hausler ..... Coring sand 3,032 ft.
The Texas Company's No. 4 fee (workover) ..... Drlg. sand and shale showing oil 3,984 ft.

LOST LAKE—CHAMBERS COUNTY

Pure Oil Co.'s No. 10 Mayes ..... Cemented casing.
Pure Oil Co.'s No. 4 Lost Lake ..... Drlg. gumbo 2,438 ft.

NASH—BRAZORIA COUNTY

Rycade Oil Corp.'s No. 26 Wisdom ..... Total depth 5,826 ft.; sidetracking 5,645 ft.

BATSON—HARDIN COUNTY

Ada Belle Oil Co.'s No. 133 Sun ..... No report.
East Batson Oil Co.'s No. 9 Bates ..... No report.

SOUR LAKE—HARDIN COUNTY

Lake View Oil Co.'s No. 8 Minor ..... No report.
Gilbert Oil Co.'s N. 107 Gilbert ..... Derrick.
M. E. Peveto's No. 1 Merchant ..... No report.
The Texas Company's No. 305 fee ..... Drlg. hard sand and shale showing oil 758 ft.

SARATOGA—HARDIN COUNTY

Rio Bravo Oil Co.'s No. 81 Cotton ..... Abandoned 591 ft.

GOOSE CREEK—HARRIS COUNTY

Humble Oil & Ref. Co.'s No. 77 Simms-Smith ..... Drlg. sand and shale 4,943 ft.
Jim McMurry's No. 4 Grace Addey ..... Rig.

SPINDLETOP—JEFFERSON COUNTY

Yount Lee Oil Co.'s No. 48 McFaddin (workover) ..... Abandoned.
Yount Lee Oil Co.'s No. 97 McFaddin (workover) ..... Drlg. 4,800 ft.
Yount Lee Oil Co.'s No. 118 McFaddin (workover) ..... Drlg. shale and lime 3,970 ft.
Yount Lee Oil Co.'s No. 124 McFaddin ..... Drlg. shale and lime 4,129 ft.
Yount Lee Oil Co.'s No. 125 McFaddin ..... Drlg. sand 3,112 ft.
Yount Lee Oil Co.'s No. 126 McFaddin ..... Drlg. 3,371 ft.
Yount Lee Oil Co.'s No. 127 McFaddin ..... Rig.
Yount Lee Oil Co.'s No. 99 Gladys City ..... Drlg. shale and lime 4,579 ft.
Yount Lee Oil Co.'s No. 45 Gladys City ..... Fishing liner.

WEST COLUMBIA—BRAZORIA COUNTY

Saxet Oil Co.'s No. 3 Hogg ..... Derrick.
The Texas Company's No. 26 Arnold ..... Cem. 6⅝-in. casing 2,666 ft.

NORTH DAYTON—LIBERTY COUNTY

John A. Deering's No. 6 fee ..... Standing.
Humble Oil & Refining Co.'s No. 1 Jamison, south ..... Total depth 4,678 ft.; cemented 7-in. casing 4,200 ft.
Harrison Oil Co.'s No. 1 Jamison ..... Drlg. sand showing oil and gas 4-, 678 ft.
Harvey Smith's No. 1 Simmons & Brown ..... Drlg. gumbo 953 ft.; casing cemented.
The Texas Company's No. 1 Paraffine fee ..... Drlg. rock 1,027 ft.

HIGH ISLAND—GALVESTON COUNTY

Gulf Production Co.'s No. 5-A Smith ..... Total depth 4,538 ft.; sidetracking 3,946 ft.
Marrs McLean's No. 17 Cade ..... Drlg. hard sand and lime 3,372 ft.
Tom C. Patten's No. 1 Jackson ..... Derrick.

ORCHARD—FORT BEND COUNTY

Gulf Production Co.'s No. 20 Moore ..... Drlg. 3,956 ft.

REFUGIO—REFUGIO COUNTY

Fox-Heflin's No. 1 Fannie Heard ..... Drlg. sticky shale 875 ft.
Hamil Drilling Co.'s No. 1 Cable ..... Cemented 10-in. casing 461 ft.
Herman F. Heep's No. 1 Vance ..... Drlg. shale 3,064 ft.
Houston Gulf Gas Co.'s No. 1 Lambert ..... Comp. flowing 300 bbls. on 3-16-in. choke; increased to 1,350 bbls. 7-16-in. choke; sand 5,879-84 ft.
Houston Gulf Gas Co.'s No. 2 Lambert ..... Drlg. sticky shale and lime 2,725 ft.
Houston Gulf Gas Co.'s No. 3 Morgan Shelley ..... Shut down 22 ft.
Houston Gulf Gas Co.'s No. 3 Morgan-Vance ..... Rig.
Houston Gulf Gas Co.'s No. 9 T. P. Shelly ..... Tested salt water; sand 3,660-71 ft.; total depth 3,692 ft.
Houston Oil Co.'s No. 1 Rooke Hotel ..... Comp. flowing 1,000 bbls. fluid, 50 per cent water, on open 2-in. line, sand 3,683 ft.; to plug back 91 ft.
Houston Oil Co.'s No. 14 Rooke ..... Cemented 12½-in. casing 490 ft.
Houston Oil Co.'s No. 1 Tom Heard ..... Drlg. shale and lime 3,915 ft.
Houston Oil Co.'s No. 1 Carlysle ..... Sand showing oil 3,695-3,711 ft.; cemented 8¼-in. casing 3,695 ft.
Houston Oil Co.'s No. 1 Shelton ..... Drlg. sandy lime 1,142 ft.
Houston Oil Co.'s No. 1 Dorsey ..... Drlg. hard sandy lime 2,794 ft.
Houston Oil Co.'s No. 1 Doughty ..... Drlg. lime 1,007 ft.
Houston Oil Co.'s No. 9 Fannie Heard (workover) ..... Pulling liner to deepen 1,567 ft.
Independent Oil & Gas Co.'s No. 1-C Heard ..... Drlg. gumbo 1,495 ft.
Independent Oil & Gas Co.'s No. 3 Claude Heard ..... Drlg. sand and boulders 724 ft.
Independent Oil & Gas Co.'s No. 1 T. P. Shelley ..... To plug back.
Independent Oil & Gas Co.'s No. 1 Huddleston ..... Location.
Independent Oil & Gas Co.'s No. 1 Mercy Academy ..... Cem. 12¼-in. casing 1,180 ft.
Independent Oil & Gas Co.'s No. 1 Helen Reilly ..... Drlg. gumbo 3,593 ft.
Independent Oil & Gas Co.'s No. 6 Reilly ..... Comp. flowing 50 bbls. pipe line oil 3,683-89 ft.
Independent Oil & Gas Co.'s No. 3 West ..... Rig.
Karona Oil Co.'s No. 1 Zarsky ..... Drlg. gumbo 390 ft.
Edwin M. Jones' No. 1-A Leisering ..... Flowing 350 bbls. pipe line oil, ¼-in. choke 3,681-85 ft.
Edwin M. Jones' No. 1-A J. F. B. Heard ..... Drlg. broken shale 2,630 ft.
Edwin M. Jones' No. 1-A Mitchell ..... Location.
Edwin M. Jones' No. 1 Jeter ..... Drlg. rock 3,573 ft.
Mission Drlg. Co.'s No. 1 O'Brien ..... Drlg. lime 1,019 ft.
Mission Drlg. Co.'s No. 1 Moss ..... Drlg. hard lime 3,804 ft.
T. P. Morgan's No. 1 City ..... Derrick.
Morgan & Morgan's No. 1 Rooke ..... Drlg. sticky shale and lime 5,080 ft.
Morgan Oil Corp.'s No. 5 City ..... Drlg. sandy shale and lime 3,135 ft.
Morgan Oil Corp.'s No. 1 Hornburg ..... To abandon 3,719 ft.
Morgan Oil Corp.'s No. 1 Fox, Block 70 ..... Drlg. sandy shale and lime 2,270 ft.
Morgan Oil Corp.'s No. 1 Tom Heard ..... Drlg. oil sand 5,472-79 ft.
Morgan Oil Corp.'s No. 1 Carlysle, Block 2 ..... Drlg. shale and lime 4,500 ft.
Morgan Oil Corp.'s No. 1 Powers ..... Drlg. sticky shale 3,335 ft.
Pearson Properties' No. 1 Ryalls ..... Drlg. hard sandy lime 4,265 ft.
Ed Price et al's No. 1 Mission River ..... Drlg. sticky shale 2,497 ft.; shut down for repairs.
Refugio Oil Corp.'s No. 1 Wheeler heirs ..... Oil sand 3,667-84 ft.; set 6⅝-in. casing.
Rutherford-Traylor Oil Co.'s No. 1 Cable ..... Derrick.
Saxet Oil Co.'s No. 2 Cable ..... Standing partly rigged.
Saxet Oil Co.'s No. 2 Ryals ..... Location.
Saxet Oil Co.'s No. 3 Holmes Heard (old well) ..... To sidetrack 3,673 ft.
Sun Oil Co.'s No. 3 Buckley, Lot 5, Blk. 2 ..... Drilled plug, running tubing, 3,670-93 ft.
The Texas Company's No. 1 Shelton ..... Drlg. salt water sand 5,508 ft.
Union Producing Co.'s No. 2 O'Brien ..... Tested salt water; sand 5,554-68 ft.
Union Producing Co.'s No. 3 O'Brien ..... Rig.
Union Producing Co.'s No. 1 Tom Heard, Blk. 3 ..... Rig.
Union Producing Co.'s No. 1 Ben Shelton ..... Blew out while coring and blowing wild; total depth 5,800 ft.
Union Producing Co.'s No. 2 J. F. B. Heard ..... Comp. flowing 450 bbls., ¼-in. choke, 3,668 ft.
Union Producing Co.'s No. 3 Powers ..... Derrick.
Union Producing Co.'s No. 1-A Rose Lambert ..... Reaming to set 8¼-in. casing; total depth 5,214 ft.

SOUTH LOUISIANA FIELDS

LOCKPORT—CALCASIEU PARISH

Vacuum Oil Co. and Gulf Ref. Co.'s No. 25 Miller ..... Set screen, washing; total depth 3,803 ft.
Vacuum Oil Co. and Gulf Ref. Co.'s No. 26 Miller ..... Derrick.
Vacuum Oil Co. and Gulf Ref. Co.'s No. 27 Miller ..... Derrick.
Vacuum Oil Co. and Gulf Ref. Co.'s No. 8 Bordages ..... Drilled plug 4,401 ft.

HACKBERRY—CAMERON PARISH

Calcasieu Oil Co.'s No. 1 Verdine ..... No report.
Calcasieu Oil Co.'s No. 5 Caldwell ..... No report.
Sunshine Oil Co.'s No. 6 Ellender ..... Derrick.
Rex Petroleum Corp.'s No. 1 Duhon ..... Bailed dry; standing.
Rycade Oil Corp.'s No. 1 Gulf Land ..... Drlg. hard sand and lime 4,544 ft.
Rycade Oil Corp. and Humble's No. 5 Gulf Land ..... Dredging canal to location.
The Texas Company's No. 6 State, Calcasieu Lake ..... Drlg. gumbo and boulders 3,306 ft.

JENNINGS—ACADIA PARISH

Cline, Smith & Cline's No. 9 Conklin ..... No report.
The Texas Company's No. 5 Rayne heirs, King tract .... Setting casing approximately 7,000 ft.; to test.
Yount Lee Oil Co.'s No. 8 Houssiere-Latrielle, Section 47-9s-2w ..... Drlg. 5,482 ft.
Yount Lee Oil Co.'s No. 6 Crowley ..... Drlg. shale 2,945 ft.

EDGERLY—CALCASIEU PARISH

Rex Petroleum Co.'s No. 1 Hunter ..... Rig.
Strange Oil Co.'s No. 1 Koonce ..... No report.

VINTON—CALCASIEU PARISH

Marrs McLean's No. 4 Gray (workover) ..... No report.
Vinton Petroleum Co.'s No. 5 Matilda Gray ..... Pulled stuck drill stem 2,692 ft.
Vinton Petroleum Co.'s No. 6 Matilda Gray ..... Location.

BAYOU BOUILLON—ST. MARTIN PARISH

Rycade Oil Corp.'s No. 9 Bouillon fee ..... Coring water sand 2,956 ft.
Rycade Oil Corp.'s No. 5 Atchafalaya fee ..... Coring shale 4,233 ft.
The Texas Company's No. 2 St. Martin Land Co. ..... Drlg. sand and shale 5,152 ft.

STARKS—CALCASIEU PARISH

J. O. Davis' No. 1 Industrial ..... Standing 3,775 ft.

SWEET LAKE—CAMERON PARISH

Pure Oil Co.'s No. 8 Yount Lee (workover) ..... Total depth 5,569 ft.; cementing 5¾-in. casing.
Pure Oil Co.'s No. 9 Yount Lee ..... Drlg. hard sand 3,962 ft.

ANSE LA BUTTE—ST. MARTIN PARISH

Yount Lee Oil Co.'s No. 1 Hebert ..... Drlg. 4,518 ft.

SORRENTO—ASCENSION PARISH

Gulf Refining Co.'s No. 17 United Land Co. ..... Drlg. 3,812 ft.

MISCELLANEOUS WILDCATS

TEXAS

AUSTIN COUNTY

Black Oil Co.'s No. 1 Lancashire, near Sealey ..... Drlg. shale 2,406 ft.
O'Hara et al's No. 1 Batla, near Raccoon City ..... Drill stem stuck 3,450 ft.
McInnery et al's No. 1 McDay, west of Kinney ..... Shut down 500 ft.

BRAZORIA COUNTY

Alexander & Smith's No. 1 Ewin, Harvey Little Sur. .... Derrick.
Faust et al's No. 5 Faust ..... Drlg. hard sand 3,738 ft.
Rucks & Patterson's No. 1 Hunter, southwest of Hoskins .. Drlg. rock 1,050 ft.
Shell Petroleum Corp.'s No. 1 Blakely-Winston, Danbury ..... Coring sand 4,455 ft.
Steel & Strickland's No. 1 Lockridge ..... Rig.
Word Drlg. Co.'s No. 1 Proctor, west of Hoskins Mound .. Drlg. gumbo 2,115 ft.

CHAMBERS COUNTY

Shell Petroleum Corp.'s No. 1 Herff, Moss Bluff ..... Moving in material.
Sloan Prospecting Co.'s No. 1 Ulrich, Hannah Nash Sur. .. Location.

FORT BEND COUNTY

Gulf Production Co.'s No. 1 Brazos Valley, Clodine ..... Drlg. 4,704 ft.
Pure Oil Co.'s No. 1 Jackson Brown, Barrett and Harris Sur. ..... Derrick.

GRIMES COUNTY

Cranfill & Reynolds Oil Co.'s No. 1 Baylor, southeast Navasota ..... Spudded.

HARRIS COUNTY

Baldwin and associates' No. 1 Kitzman, Cypress ..... Shut down 4,100 ft.
Buffalo Oil Co.'s No. 1 Beall, Eureka ..... Abandoned in gumbo and lime 4,662 ft.
A. F. Belunek's No. 1 Thompson ..... Rig.
Cranfill & Reynolds Oil Co.'s No. 1 Brown ..... Abandoned in water sand 6,124 ft.
Higgins Oil & Fuel Co.'s No. 1 Sladous, Mykawa ..... Sand 5,340 ft.; reaming.
Humble Oil & Ref. Co.'s No. 7 Warren, Hockley ..... Drlg. sandy shale 4,208 ft.
Humble Oil & Ref. Co.'s No. 2 Minnetex ..... Standing with casing cem. 1,177 ft.
Humble Oil & Ref. Co.'s No. 1 Sladous (workover) ..... Set 4 joints 4½-in. screen 4,906 ft.; testing.
Humble Oil & Ref. Co.'s No. 2 Woodburn ..... Drlg. sand 5,094 ft.

Rich et al's No. 1 Highlands ..... Derrick.
Martin, Drake & Jones' No. 1 Haney ..... Drlg. shale 2,165 ft.
Watts Brothers' No. 1 Hubert, Mykawa ..... Drlg. sand and shale ,,824 ft.

JEFFERSON COUNTY

Bayou Oil Co.'s No. 1 Hooks-Borduge ..... Rigging.
Gulf Production Co.'s No. 8 Bordages ..... Drlg. hard sand 5,823 ft.
Gulf Production Co.'s No. 1-A Guy Junker, Fannett ..... Drlg. lime 5,502 ft.
Gulf Production Co.'s No. 13 Thomas, Fannett ..... Drlg. shale 3,180 ft.
Gulf Production Co.'s No. 5 Burrell, Fannett ..... Started drilling.
Stilwell Oil Co.'s No. 1 Brinkman ..... Drlg. water sand 3,601 ft.
The Texas Company's No. 2 Pipkin, Big Hill ..... Set 245 ft. 4¾-in. screen 6,010 ft.; blowing dry gas. ⅝-in. choke.
The Texas Company's No. 1 Fitzhugh, Big Hill ..... Drlg. sticky shale 5,810 ft.
Westbury Oil Co.'s No. 1 West, Choate Sur. ..... Drlg. gumbo 2,582 ft.

LIBERTY COUNTY

Gulf Production Co.'s No. 1 Weiser ..... Drlg. sand, slight show, 6,048 ft.
Gulf Production Co.'s No. 3 Boyt, Hankamer ..... Cemented casing to test sand 4,-650-81 ft.
Gulf Production Co.'s No. 1 McFaddin, Moss Bluff ..... Shut in producer.
Humble Oil & Ref. Co.'s No. 6 Sterling, Moss Bluff ..... Location.
Cranfill & Reynolds Oil Co.'s No. 7 Esperson, Sheeks ..... Drlg. gumbo 1,790 ft.
Cranfill & Reynolds Oil Co.'s No. 2 Davis, Sheeks ..... Comp. flowing 350 bbls. pipe line oil; 2 joints screen 2,304 ft.
Cranfill & Reynolds Oil Co.'s No. 8 Esperson, Sheeks ..... Spud.
Cranfill & Reynolds Oil Co.'s No. 9 Esperson, Sheeks ..... Location.
Yount Lee Oil Co.'s No. 2 Moores Bluff, Sheeks ..... Fishing drill pipe 6,689 ft.

MATAGORDA COUNTY

Cockburn et al's No. 1 Hawkins, Shepherds, Mott ..... Drlg. shale 3,909 ft.

MONTGOMERY COUNTY

Kelley-Kaker's No. 2 Guergus ..... Drlg. 200 ft.

ORANGE COUNTY

Gulf Production Co.'s No. 1 J. H. Starks, Port Neches ... Drlg. sand and shale 6,470 ft.
Gulf Production Co.'s No. 1 M. H. Starks, Port Neches ... Location.
The Texas Company's No. 2 Polk, Port Neches ..... Set 2 joints screen 3,150 ft., flowed 1,317 bbls. first 24 hours, ⅝-in. choke; gravity 21.9 degrees.
The Texas Company's No. 2 Kuhn, Port Neches ..... Location.
The Texas Company's No. 2 Stark, Port Neches ..... Location.

WALLER COUNTY

Kirby Petroleum Co.'s No. 1 Davis, San Felipe ..... Total depth 2,941 ft.; well blew out around casing; derrick wrecked.
W. P. Morris' No. 1 Chapman, Donoho Sur. ..... Shut down 1,867 ft.

SOUTH LOUISIANA
ASSUMPTION PARISH

Gulf Refining Co.'s No. 1 Armilise, Napoleonville ..... Coring sand 5,290 ft.

CALCASIEU PARISH

Wilfred Lahay's No. 2 James ..... No report.

CAMERON PARISH

Shell Petroleum Corp.'s No. 14 Watkins, Black Bayou ... Building derrick.
The Texas Company's No. 5 Calcasieu Lake, Calcasieu Lake Dome ..... Building derrick.
Vacuum Oil Co.'s No. 1 Cameron Meadows, Sec. 21-14s-13w ..... Drlg. sandy shale 1,309 ft.; slight show oil.

IBERIA PARISH

The Texas Company's No. 4 Vermillion Bay ..... Drlg. broken sand and shale 6,105 ft.

IBERVILLE PARISH

Shell Petroleum Corp.'s No. 4 Wilbert, White Castle .... Sticky shale 2,022 ft.; cemented 13⅜-in. casing.
Standard Oil Co.'s No. 4 Schwing, Bayou Blue ..... Rig.
Standard Oil Co.'s No. 5 Wilbert, Bayou Blue ..... Derrick.
Standard Oil Co.'s No. 6 Wilbert, Bayou Blue ..... Derrick.
Standard Oil Co.'s No. 1 Case, Bayou Des Glaise ..... Drlg. 869 ft.

JEFFERSON DAVIS PARISH

Pure Oil Co.'s No. 1 May, Sec. 1-10s-5w ..... Fishing drill pipe 3,970 ft.
Yount Lee Oil Co.'s No. 1 Courtney, Welsh ..... Rig.

LA FOURCHE PARISH

Gulf Refining Co.'s No. 1 City of New Orleans, Bay Champagne ..... Drlg. 4,352 ft.

PLAQUEMINE PARISH

Humble Oil & Ref. Co.'s No. 1 Cockrell-Moran, Lake Grand Ecaille ..... Sandy shale 1,738 ft.
Humble Oil & Ref. Co.'s No. 1 Lake Washington, Lake Grand Ecaille ..... Total depth 4,260 ft.; sidetracking 4,255 ft.
The Texas Company's No. 4 State, Garden Island Bay ... Location.

ST. LANDRY PARISH

Elbof Exploration Co.'s No. 1 Ledoux, Eunice ..... No report.
Herbert-Baker Oil Co.'s No. 1 Fisher, Sec. 10-3S-4e ..... No report.
Gulf Refining Co.'s No. 3 Gaudet, Port Barre ..... Rig.
The Texas Company's No. 5 Botney Bay, Port Barre .... Rig.
The Texas Company's No. 6 Botney Bay, Port Barre .... Location.

ST. MARTIN PARISH

The Texas Company's No. 1 fee, Hager Dome ..... No report.
The Texas Company's No. 3 fee, Hager ..... Location.
The Texas Company's No. 2 St. Martin ..... See Bayou Bouillon.
The Texas Company's No. 1 Iberville, Hager ..... No report.

ST. MARY PARISH

Louisiana Land & Exploration Co.'s No. 2 Clark, Berwick.. No report.
Pure Oil Co.'s No. 1 Wax Lake, Sec. 12-17s-9e ..... Rigging.
Vacuum Oil Co.'s No. 1 Zenor, Patterson ..... Drlg. shale 3,637 ft.

TERREBONNE PARISH

Charles Paggi's No. 2 Evergreen, Sec. 145-15s-16e ..... No report.
The Texas Company's No. 4 State-Bay St. Elaine ..... Derrick.
The Texas Company's No. 2 La. L. & E. Co., Dog Lake... Total depth 6,297 ft.; twisted off 35 fourbles drill pipe; waiting orders.
The Texas Company's No. 2 State, Lake Pelto ..... Location.
The Texas Company's No. 3 State, Lake Pelto ..... Oil sand 4,278-4,389 ft.; cemented 9⅝-in. casing 4,297 ft.
The Texas Company's No. 2 State, Caillou Island ..... No report.
The Texas Company's No. 3 State, Caillou Island ..... Location.
The Texas Company's No. 3 State, Lake Barre ..... Drlg. gumbo 3,450 ft.
The Texas Company's No. 4 State, Lake Barre ..... Location.
The Texas Company's No. 3 La. L. & E. Co., Four Isle ... Location.

LOUISIANA-ARKANSAS PROVEN AREAS

(Continued from Page 69)

The Texas Co.'s No. 2 Peyton, 990 ft. N, 330 ft. W, SE cor., Sec. 25-23-12 ..... Rig up.
The Texas Co.'s No. 4 Peyton, 990 ft. E, 330 ft. N, SW cor., Sec. 30-23-11 ..... Derrick.
The Texas Co.'s No. 3 Wilkinson, 990 ft. S, 330 ft. E, NW cor., Sec. 31-23-11 ..... Derrick.
The Texas Co.'s No. 4 Wilkinson, 330 ft. S, 330 ft. E, NW cor., Sec. 31-23-11 ..... Derrick.
Tippett et als' No. 1 Holmes, 200 ft. S, 200 ft. W, NE cor. NE NW, Sec. 36-23-12 ..... Location.
John Woodley et als' No. 2 L. & A., 990 ft. N, 990 ft. W. SE cor., Sec. 14-23-12 ..... Completed Mar. 30, '26, flowing 200 bbls. fluid, 80% S.W; 4-ft. sand; T.D. 3,081 ft; rigging up to deepen.
Woodley et als' No. 1 Roberson, 330 ft. N, 330 ft. W, SE cor. SW NE, Sec. 22-23-12 ..... Rig up.

CADDO PARISH—GREENWOOD

Calatex O. & G. Co.'s No. 1 Taylor Trosper, 2,519 ft. S, 1,293 ft. E, CWL, Sec. 7-16-16 ..... Drlg. 1,400 ft.

CADDO PARISH—HOSSTON

Bayou State Oil Corp.'s No. 1 Barr, 450 ft. S, 650 ft. W, NE cor. NW SE, Sec. 30-22-15 ..... W.O.S.R. 1,129 ft.
Bayou State Oil Corp.'s No. 29 Jolly, 425 ft. W, 775 ft. N, SE cor. NE ..... W.O.S.R. 1,014 ft.

CADDO PARISH—DIXIE

Dixie Oil Co.'s No. 1 Dickson, 300 ft. N, 300 ft. E. SW cor., Sec. 10-19-14 ..... Location.
Sam Gold's No. 3 Hunter, 660 ft. N, 660 ft. W. SE cor. SW NE, Sec. 17-19-14 ..... 200 ft. oil and S.W. in hole 2,-457 ft; W.O.S.R; topped broken sand 2,415 ft.

CADDO PARISH—MOORINGSPORT DISTRICT

Falcon Oil Co.'s No. 2 Nunnely, 3,012 ft. N, 3,091 ft. E, SW cor., Sec. 29-20-15 ..... S.D. 1,600 ft.

CADDO PARISH—OIL CITY

Gulf Ref. Co.'s No. 24-A Levee Board, 200 ft. S, 200 ft. W, NE cor. SW NW, Sec. 34-21-16 ..... Began drlg. Feb. 23; set 10-in. 103 ft.
H. M. Matson's No. 1 U. S. Govt., 900 ft. E, 400 ft. S, NW cor. ..... Drlg. 2,000 ft.
The Texas Co.'s No. 72 Levee Board, 725 ft. N, 210 ft. E. SW cor. SE, Sec. 27-21-6 ..... Cmtd. 8-in.; drlg. 1,800 ft.
The Texas Co.'s No. 73 Levee Board, 1,642 ft. E, 780 ft. N, SW cor. SW SE, Sec. 27-21-16 ..... Location.
Thomason & Fitzsimmons' No. 1 Howell, 600 ft. S, 300 ft. W, NE cor. SE, Sec. 13-22-16 ..... Drlg. 2,750 ft.

PINE ISLAND

Shreveport Oil Corp.'s No. 4 Hicks, Sec. 32-19-15 ..... Drlg. 1,700 ft.

CLAIBORNE PARISH—HOMER

Oakes et als' No. 1 Richardson, NE SE, Sec. 19-21-17 ... S.D. 1,700 ft.

LA SALLE PARISH—URANIA

Ark. Fuel Oil Co.'s No. 5 Urania, 200 ft. S, 200 ft. E, NW cor. NE SE, Sec. 24-10-1e ..... Drlg. 4,650 ft.
Gulf States Gas Co.'s No. 1 Urania, 250 ft. W, 150 ft. S, NE cor., Sec. 1-10-1e ..... Drlg. 1,000 ft.
Hope Oil Co.'s No. 5 Urania, 660 ft. E, 150 ft. S, NW cor. SW SW, Sec. 19-10-2e ..... Derrick.
Kinney, Hardtner & Randall's No. 1 Kinney, SW SW, Sec. 7-10-2e ..... S.D. 1,570 ft.
S. D. Ray's No. 1 Urania, Sec. 19-10-2e ..... 1,200 ft. oil, some S.W; 3-ft. sand; W.O.S.R. 1,568 ft.

MOREHOUSE PARISH

Bahan & Bahan's No. 3 Feazel, 990 ft. S, 990 ft. W, NE cor. Sec. 3-20-4 ..... Cmtd. 6-in. 2,088 ft.
Bahan & Bahan's No. 4 Feazel, 900 ft. W, 330 ft. S, NE cor., Sec. 3-20-4 ..... Location.
J. S. Herkness' No. 12 Bowles, 3,292 ft. E, 3,300 ft. S, NW cor., Sec. 18-20-5 ..... Drlg. 2,730 ft.
Magnolia Pet. Co.'s No. 8 U. S. Govt., 310 ft. S, 410 ft. E. NW cor., Lot 4, Sec. 33-21-5 ..... S.D. on account of high wtr; T. D. 204 ft.
Nat. Gas Prod. Co.'s No. 25 Crosset Lbr. Co., 1,444 ft. S, 793 ft. W, NE cor. NW, Sec. 29-21-5 ..... Cmtd. 6-in. 2,210 ft.
J. A. Noe et als' No. 1 Wright, 694 ft. N, 393 ft. W, C, Sec. 27-20-4 ..... Drlg. 975 ft.
Southern Carbon Co.'s No. 14 Tensas, 660 ft. N, 660 ft. E, SW cor. NW, Sec. 34-21-4 ..... S.D. on account high wtr; T.D. 2,081 ft.

OUACHITA PARISH

Chauvin Gas Co.'s No. 4 Slagle Johnson, 647 ft. W, 2,803 ft. S, NE cor., Sec. 47-18-4 ..... Rig up.
Hope Prod. Co.'s No. 2 Fairbanks, 1,876 ft. E, 628 ft. N, SW cor. SE, Sec. 25-20-4 ..... Drlg. 50 ft.
Hope Prod. Co.'s No. 3 Fairbanks, 1,876 ft. E, 628 ft. S, NW cor. NE, Sec. 36-20-4 ..... Location.
G. E. Jordan's No. 1 Anding, NW NE, Sec. 18-18-15 .... Waiting cmt. to set 2,480 ft.
La. Gas & Fuel Co.'s No. 1 Beard, Sec. 46-18-4 ..... Cmtd. 6-in. 2,143 ft.
Magnolia Pet. Co.'s No. 2 fee 401, 660 ft. S, 660 ft. E, NW cor., Sec. 2-18-3 ..... Derrick.
Sho-Van Gas Products Co.'s No. 3 W. Va., 1,980 ft. S and W, NE cor., Sec. 8-18-4 ..... Cmtd. 6-in. 2,145 ft.
Sho-Van Gas Products Co.'s No. 4 W. Va., 1,078 ft. N, 294 ft. W, NE cor., Sec. 49, in Sec. 7 ..... Rig up.
Union Gas Products Co.'s No. 1 Hare, 660 ft. S, 660 ft. W, NE cor. NW, Sec. 22-19-5 ..... D.S. test 2,565 ft; dry; W.O.
United Oil & Nat. Gas Products Co. of La.'s No. 5 Guthrie, 6,396 ft. N, 6,022 ft. W, cor. Secs. 49, 26, and 25, Sec. 49-20-5 ..... Derrick.
United Carbon Co.'s No. 2 Puckett, 660 ft. N, 660 ft. E, SW cor. SW, Sec. 15-19-5 ..... Drill stem stuck; T.D. 2,459 ft; fishing.
United Carbon Co.'s No. 4 Spade, 774 ft. S, 2,081 ft. E, NW cor., Sec. 6-18-4 ..... S.D. 2,040 ft.
United Carbon Co.'s No. 6 Spade, 1,180 ft. S, 140 ft. E, NW cor., Sec. 27-19-4 ..... Location.
United O. & N. G. Co.'s No. 2 Cole, 660 ft. S, 594 ft. E, C, Sec. 26-20-4 ..... Derrick.

RICHLAND PARISH

Ark.-La. P. L. Co.'s No. 3-B E. A. and F. B. Sartor, 300 ft. N, 330 ft. E. SW cor., Sec. 24-16-5 ..... Set 12-in. 785 ft.
W. C. Feazel's No. 1 R. B. Simon, 2,406 ft. W, 2,020 ft. S, NE cor., Sec. 11-16-6 ..... Rig up.
Franklin O. & G. Co.'s No. 1 F. Smith, Sec. 24-16-6 ... Drlg. 2,405 ft.
International Gas Products Co.'s No. 1-B Beck, 660 ft. S, 713 ft. E. NW cor., Sec. 36-16-6 ..... Tested dry; show S.W. 2,450-70 ft; estimated 100,000 ft. gas; arranging to deepen.
International Gas Products Co.'s No. 1 Minnie La-Grone, 769 ft. N, 858 ft. E, SW cor., Sec. 7-16-7 ... Location.
La. G. & F. Co.'s No. 1 Chapman, 2,497 ft. E, 1,980 ft. S, NW cor., Sec. 36-16-6 ..... Set 6-in. 2,300 ft.
M. L. Meredith's No. 1 Hoidness, 1,980 ft. S, 990 ft. W, NE cor., Sec. 15-16-6 ..... Drlg. 2,446 ft.
Nat. Gas Products Co.'s No. 1-C Sartor, 536 ft. N, 1,333 ft. E, SW cor. NW, Sec. 21-16-6 ..... Cmtng. 8-in. csg. 865 ft.
Palmer Corp.'s No. 1-A F. N. Boykin, 660 ft. N, 660 ft. W, SE cor. NE, Sec. 20-17-6 ..... Tested 9,000,000 ft. gas and leaky csg. at 2,446 ft; arranging to re-test.
Palmer Corp.'s No. 1-A Earl, Sec. 2-16-6 ..... Fishing for liner 2,500 ft.
Southern Carbon Co.'s No. 1 Hale, 660 ft. N, 760 ft. W, SE cor., Sec. 16-16-6 ..... Flowed S.W; arranging to recmt. 6-in; T.D. 2,460 ft.
Southern Carbon Co.'s No. 1 Lindow, 3,300 ft. W, 1,320 ft. S, NE cor., Sec. 16-16-6 ..... Derrick.
Southern Carbon Co.'s No. 1 McCoy, 1,980 ft. E, 3,300 ft. S, NE cor., Sec. 16-16-6 ..... Drlg. 1,781 ft.
United Carbon Co.'s No. 1 D. R. Sartor, 3,341 ft. W, 3,960 ft. S, NE cor., Sec. 11-16-6 ..... Drlg. 2,160 ft.

SABINE PARISH—PLEASANT HILL

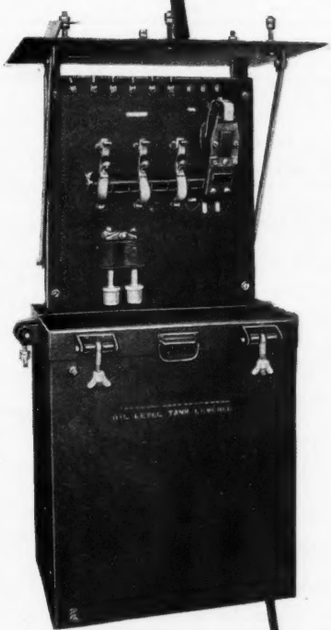
Ark. Fuel Oil Co.'s No. 4 Horne, 370 ft. S, 450 ft. W, NE cor. SW, Sec. 33-10-12 ..... Began drlg. Feb. 20; set 12½-in. 215 ft; drlg. 1,220 ft.
Bridges-Clarke Oil Co.'s No. 1 Guy, 300 ft. N, 300 ft. E, SW cor. SE SE, Sec. 33-10-12 ..... Arranging to test 3,300 ft.
Hatcher et als' No. 1 Moore heirs, 300 ft. N, 300 ft. E, C, Sec. 32-10-12 ..... Derrick.
Magnolia Pet. Co.'s No. 2 McLeroy, 230 ft. S, 200 ft. W, NE cor. W½ SE SW, Sec. 33-10-12 ..... Tested S.W. 2,187 ft; drlg. 2,-248 ft.

SABINE PARISH—ZWOLLE

Amerada Pet. Corp.'s No. 1 Bowman-Hicks 330 ft. N, 330 ft. W, SE cor. NE NE, Sec. 33-8-12 ..... 500 ft. oil in hole; S.D; W.O.S.R. 2,456 ft.
Benedum & Trees Oil Co.'s No. 3 Bowman-Hicks, 330 ft. S, 330 ft. W, NE cor. SE, Sec. 34-8-12 ..... Drlg. 1,450 ft.
R. L. Gay, trustee's No. 6 Bowman-Hicks, 900 ft. N, 800 ft. W. SE cor. NW SE, Sec. 14-7-14 ..... Bailing to test 2,567 ft.
Benedum & Trees Oil Co.'s No. 4 Bowman-Hicks, 330 ft. N, 330 ft. W, C, Sec. 34-8-12 ..... Derrick and rig moved.

A group of seven 100- and 60-hp. G-E motors with G-E compensators, used on water-circulating pumps, Continental Oil Co., Ponca City, Okla.

Standard G-E compensator (oil tank lowered)



G-E standard oil-immersed magnetic switch

Your Control Equipment—

Is it Efficient?

The control for your refinery's pump motors, compressors, process machinery, for example—can it meet modern requirements?

G-E engineers suggest that you give thought to certain special features of modern G-E control that will give you added protection and economy. Time-delay undervoltage relays, for example. They are easily adapted to standard G-E compensators and prevent shut-downs caused by momentary voltage dips. Where across-the-line magnetic starters are used, there is a G-E push-button station which also gives you this feature.

You may be concerned with arcing at contacts in air on your present compensators. A slight modification of the standard G-E hand compensator will eliminate this condition. And here again, if across-the-line starting equipment is desired, oil-immersed starters with push-button control are available.

Why not investigate these special features of G-E control? Your nearest G-E office will gladly supply you with complete information.

Motorized Power
—fitted to every need

200-347 A

JOIN US IN THE GENERAL ELECTRIC HOUR, BROADCAST EVERY SATURDAY AT 9 P.M., E.S.T. ON A NATION-WIDE N.B.C. NETWORK

GENERAL ELECTRIC

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

Benedum & Trees Oil Co.'s No. 5 Bowman-Hicks, 900 ft. S, 1,400 ft. W, C, Sec. 34-3-13 ... Rig up.
Benedum & Trees' No. 6 Bowman-Hicks, 330 ft. N, 330 ft. E, SW cor. SE, Sec. 33-3-12 ... Rig up.
Benedum & Trees Oil Co.'s (was R. L. Gay, trustee's) No. 2-A Bowman-Hicks Lbr. Co., 200 ft. S, 200 ft. W, NE cor. NE NW ... Dry; show oil 2,435 ft; tested 100 ft. oil 2,453 ft; W.O.
R. L. Gay, trustee's No. 3 Sabine Lbr. Co., 1,120 ft. N, 200 ft. E, SW cor., Sec. 13-7-14 ... Drlg. 2,305 ft.
W. G. Gray's No. 1 Bolin, Sec. 31-8-12 ... Drlg. 1,420 ft.
Haynes Bros.' No. 1 Dover, 1,120 ft. W, 200 ft. N, SE cor. NE, Sec. 28-8-12 ... 500 ft. oil in hole; shot formation with 12 and 42-qt. shots nitro 2,683 ft; did not help; now drlg. 2,700 ft.
Lide et als' No. 2 Sabine Lbr. Co., 330 ft. S, 330 ft. W, NE cor. NW SE, Sec. 31-8-12 ... Set 10-in. 105 ft; drlg. 1,080 ft.
V. M. Miller's No. 1 Colquitt, 300 ft. S, 230 ft. W, NE cor. SE, Sec. 31-8-12 ... Drlg. 1,135 ft.
Olsen Bros.' No. 1 Keeler, SW cor. SW SE, Sec. 27-8-12 ... T.A. 2,625 ft.
Olsen Bros.' No. 1 Leone, 150 ft. N, 250 ft. E, SW cor. SW NW, Sec. 32-8-12 ... Set 10-in. 102 ft; drlg. 250 ft.
Ruston Drlg. Co.'s No. 1 Bowman-Hicks, 330 ft. S, 330 ft. W, NE cor., Sec. 4-7-12 ... Set 6⅝-in. 2,411 ft.
Ruston Drlg. Co.'s No. 1-A Bowman-Hicks, 330 ft. S, 330 ft. E, NW cor. SW SW, Sec. 35-8-12 ... Derrick.
Ruston Drlg. Co.'s No. 1 Holliday, 330 ft. N, 330 ft. E, SW cor. NW, Sec. 35-8-12 ... Arranging to shoot formation 2,728 ft; 100 ft. oil and show S.W.
Sabine O. & G. Co.'s No. 1 Anderson, 200 ft. N, 200 ft. E, SW cor. SW NW, Sec. 19-18-13 ... Tested S.W. 2,603 ft; W.O.
Standard Oil Co.'s No. 1 L. N. Nunn, 990 ft. S, 330 ft. E, C, Sec. 32-8-12 ... Location.
Stovall Drlg. Co.'s No. 1 Lefkovitz, 247 ft. N, 250 ft. W, SE cor. N¼ SE NW, Sec. 33-8-12 ... Set 6⅝-in. 2,328 ft; T.D. 2,335 ft.
A. H. Tarver's No. 1 Sabine State Bank, 250 ft. N, 250 ft. W, C, Sec. 27-8-12 ... 20 ft. oil in hole; W.O. 2,373 ft.
Tippett Drlg. Co.'s No. 1 Hughes, 200 ft. S, 200 ft. E, NW cor. SW NW, Sec. 36-8-12 ... Abd. 2,600 ft.
Warner-Quinlan Co.'s No. 1 Sabine Lbr. Co., 238 ft. N, 328 ft. W, SE cor. NW NE, Sec. 34-8-12 ... Arranging to deepen 2,680 ft.
Warner-Quinlan Co.'s No. 1 Peterson, 660 ft. S, 660 ft. W, NE cor. NW SE, Sec. 26-8-13 ... Dry 2,550 ft; coring 2,555 ft.

UNION PARISH

Lyons Gas Co.'s No. 2 Jones, 1,190 ft. W, 138 ft. S, NE cor. NW, Sec. 11-20-3 ... Set 6-in. 2,115 ft.

WEBSTER PARISH—COTTON VALLEY

Palmer Corp.'s No. 3 Miller, 660 ft. N, 660 ft. E, SW cor., Sec. 28-21-10 ... Cmtng. 6⅝-in. 4,365 ft.
Standard Oil Co.'s No. 1-B Crichton, 660 ft. S, 660 ft. E, NW cor., Sec. 33-21-10 ... Drlg. shale 4,283 ft.

WEBSTER PARISH—SAREPTA AND SHONGALOO

Bateman et als' No. 2 Womble, 2,840 ft. S, 1,120 ft. E, NW cor., Sec. 1-22-11 ... Cmtd. 6-in. 2,701 ft; T.D. 2,715 ft; 1,500 ft. fluid; 4-ft. sand; W.O.S.R.
Donohoe O. & G. Co.'s No. 1-B W. B. Roseberry, 250 ft. S, 250 ft. E, C, Sec. 19-23-9 ... Rig moved; hole abd. 104 ft.
Pat Hudson's No. 2 S. Gardner, 330 ft. N, 300 ft. E, C, Sec. 1-22-11 ... Derrick.
Pat Hudson's No. 1 B. L. Slack, 330 ft. W, 330 ft. N, SE cor. NW, Sec. 36-23-11 ... 10-in. 180 ft; drlg. 2,000 ft.
Jacob Luskin's No. 2 Pardee, 1,270 ft. W, 50 ft. S, NE cor. NW, Sec. 3-22-11 ... W.O.S.R. 2,656 ft.
Magnolia Pet. Co.'s No. 1 J. P. Baker, 1,120 ft. S, 225 ft. E, NW cor. SW, Sec. 35-22-11 ... Arranging to plug back to 3,054 ft; to test show estimated 7,000,000 ft. gas 3,284 ft; T.D. 3,392 ft.
Magnolia Pet. Co.'s No. 2 Denman, 100 ft. N, 160 ft. W, SE cor. NE NW, Sec. 1-22-11 ... Swbng. to test 2,749 ft.
Merritt & Merritt's No. 1 Boucher (no check), SE SE, Sec. 17-23-11 ... Drlg. 860 ft.
Sarepta Oil Co.'s No. 1 L. S. Gardner, 300 ft. S, 300 ft. W, C, Sec. 1-22-11 ... W.O.S.R; 600 ft. fluid; T.D. 2,719 ft.

ARKANSAS

JOHNSON COUNTY—CLARKSVILLE

Ark. La. P. L. Co.'s No. 1 Patterson, 1,020 ft. S, 2,570 ft. E, NW cor., Sec. 14-10-24 ... Fishing for bit 2,230 ft.

NEVADA COUNTY

Roy Davis et als' No. 1 Chas. Henry, 1,120 ft. N, 1,120 ft. W, SE cor., Sec. 10-12-20 ... Rig up.
C. F. Steele's No. 1 E. W. Groves, Sec. 21-14-20 ... Shut down.

OUACHITA COUNTY—MOUNT HOLLY DISTRICT

McDonald Bros.' No. 2 Wilson, 700 ft. S, 275 ft. W, NE cor. NW SW, Sec. 25-15-18 ... Rig up.

OUACHITA COUNTY—SMACKOVER

J. H. Hamilton's No. 1 Arnold & Doyle, SE SE, Sec. 23-15-16 ... Pumping; no gauge; 2,039 ft.
Southern Producing Co.'s No. 3-A Watts, 700 ft. E, 150 ft. N, SW cor. SE SW, Sec. 27-15-15 ... Set 6-in. 2,037 ft; T.D. 2,045 ft.
J. D. Wingfield's No. 1 Martin, SW cor., Sec. 26-15-15 ... Set 6⅝-in. 2,085 ft; tested little oil and S.W; W.O; T.D. 2,115 ft.

OUACHITA COUNTY—STEPHENS

Magnolia Pet. Co.'s No. 1 Grayson, C, Lot 30, NE SE, Sec. 21-15-19 ... W.O.S.R; 800 ft. fluid; T.D. 1,478 ft.
Magnolia Pet. Co.'s No. 2 Grayson, 150 ft. N, 200 ft. W, SE cor. NE, Sec. 21-15-19 ... Rig up.

UNION COUNTY—EL DORADO

H. L. Hunt's No. 6 Pratt, 150 ft. N, 330 ft. E, SW cor. NE NE, Sec. 7-18-15 ... Drlg. 2,214 ft.
Malloy & Co.'s No. 4 Goodwin, 300 ft. N, 300 ft. E, SW cor. NE NE, Sec. 36-17-16 ... Arranging to set 6⅝-in. 2,186 ft.
Malloy & Co.'s No. 3 Robertson, NE cor. S½ SW NE, Sec. 6-18-15 ... Location.
Rice et als' No. 1 W. Ralty, 150 ft. S, 150 ft. E, NW cor. SW, Sec. 7-17-15 ... Spudded July 18; cmtd. 10-in. at 92 ft.
Weisinger & Ball's No. 1 Rogers, 1,014 ft. N, 150 ft. E, SW cor. E½ SW SE, Sec. 31-17-15 ... W.O.S.R. to drill in with cable tools; T.D. 2,170 ft.

UNION COUNTY—SMACKOVER

E. L. Chapman's No. 2 Bradley, 320 ft. N, 330 ft. E, SW cor. Lot 3, NW, Sec. 2-16-16 ... 10-in. 103 ft; fishing drill stem 1,590 ft.
Lion Oil Ref. Co.'s No. 1 James, CWL, Lot 2, NW, Sec. 6-16-15 ... T.A. 2,018 ft.

EAST TEXAS

PANOLA COUNTY

Ark.-La. P. L. Co.'s No. 11 Werner, 1,850 ft. S, 1,052 ft. W, NE cor. E. F. Mitcheson Sur. ... Drlg. 2,537 ft.
Calatex O. & G. Co.'s No. 3 Caldwell, 243 ft. S, 1,034 ft. W, SE cor. John Womack Sur., in Jas. Shadoin Sur. ... S.D; W.O. 1,072 ft.
Magnolia Pet. Co.'s No. 2 G. C. Tiller, Jane Thorpe Sur. ... Fishing D.S; T.D. 3,303 ft.
Magnolia Pet. Co.'s No. 6 G. C. Tiller, 393 ft. S, 1,990 ft. E, NW cor. Jane Thorpe Sur. ... Drlg. lime and shale 3,280 ft.
Nat. Gas Prod. Co.'s No. 8 Roquemore, B. C. Jordan Sur. ... Drlg. 4,000 ft.
The Texas Co.'s No. 4 H. L. Brmble, 945 ft. E, 745 ft. N, SW cor., E. F. Mitcheson Sur. ... Drlg. shale and boulders 2,000 ft.
D. Thomason's No. 5 J. M. Trosper, 4,200 ft. N, 335 ft. W, SE cor. Jane Thorpe Sur. ... Location.

WILDCAT OPERATIONS IN LOUISIANA-ARKANSAS

(Continued from Page 69)

C. W. Robinson's No. 1 Wilson, 990 ft. S, 330 ft. W, NE cor. SE, Sec. 2-15-16 ... Began drlg. Feb. 17; drlg. 175 ft.
Old River Oil Co.'s No. 1 Sibley, 300 ft. E, 300 ft. S, NW cor. SE, Sec. 15-19-14 ... W.O.S.R. 2,495 ft.
Triangle Drlg. Co.'s No. 1 Hardy et als, 660 ft. N, 660 ft. W, SE cor. fractional Sec. 18-19-16 ... Began drlg. Feb. 19; 12½-in. 64 ft.

CATAHOULA PARISH

Lochnager Pet. Co.'s No. 1 Tallaferro, 572 ft. E, 396 ft. S, C, Sec. 26-9-6 ... S.D. 900 ft.

CLAIBORNE PARISH

El Dorado Chief Oil Co.'s No. 1 Dance, C SW NE, Sec. 27-20-7 ... S.D. 2,240 ft.
Leue Oil Co.'s No. 1 Taylor, Sec. 16-22-6 ... Derrick.
Triangle Drlg. Co.'s No. 1 Kilpatrick, 660 ft. S, 660 ft. E, NW cor. SW NE, Sec. 7-19-5 ... Cored lime and sandy shale 4,518 ft; set 2-in. tubing with packer on top of liner; well flowing by heads with lots of wtr; letting well flow into tanks; making estimated 10 bbls. a day and 1,000,000 ft. gas; figure on killing well, pulling liner and deepening; T.D. 4,540 ft.

CONCORDIA PARISH

Joe Man et als' No. 1 Maxwell, C, Sec. 35-3n-8e ... S.D. account of high wtr; T.D. 400 ft.

DE SOTO PARISH

Benedum & Trees Oil Co.'s No. 1 Johnson, 300 ft. S, 300 ft. W, NE cor., Sec. 7-11-13 ... Tested 25 fourbles S.W. at 2,829 ft; tested 2,880,000 ft. gas and spray S.W; arranging to set 8¼-in. csg. 2,855 ft; T.D. 2,865 ft.
Benson Oil Co.'s No. 1 Harris, Sec. 6-10-13 ... Tested dry; show gas; W.O. 3,650 ft.
R. O. Roy's No. 1-B Farmer, 660 ft. S, 660 ft. E, NE SW, Sec. 18-13-13 ... Derrick.
R. O. Roy's No. 1-E Farmer, 660 ft. S, 660 ft. W, NE cor. NW, Sec. 5-13-13 ... Set 6⅝-in. 2,765 ft.

FRANKLIN PARISH

Davis et als' No. 1 Moore, 600 ft. W, 200 ft. S, NE cor., Sec. 12-11-6 ... S.D. 1,430 ft.
Evansville Inv. Co.'s No. 1 W. B. Welch, 945 ft. E, 511 ft. N, SW cor., Sec. 2-14-8 ... S.D. 3,030 ft.
Franklin O. & G. Co.'s No. 1 T. J. O'Brien, 300 ft. N, 300 ft. E, SW cor. NW, Sec. 17-15-9 ... Cmtd. 10-in. 908 ft.

NATCHITOCHES PARISH

S. D. McDaniel's No. 2 Clark & Morse, 800 ft. E, 350 ft. N, C, Sec. 23-5-6 ... Tested 1,000,000 ft. gas and S.W. 3 ft; S.D. for orders; T.D. 2,536 ft.
Nichols & Wilder's No. 1 Clark, 150 ft. W, 250 ft. N, SE cor., Sec. 10-10-8 ... Drlg. shale 2,574 ft.
Robeline O. & G. Co.'s No. 1 Winn, 558 ft. N, 348 ft. E, SW cor. SE, Sec. 7-8-9 ... S.D. 1,600 ft.

OUACHITA PARISH

J. L. Bullock, trustee's No. 1 W. Va. Lbr. Co., N½ NE, Sec. 25-18-5 ... S.D. account of high wtr; T.D. 2,700 ft.

RAPIDES PARISH

Ayers Bros.' No. 1 Wickliff, 2,790 ft. N, 150 ft. E, SW cor., Sec. 9-5n-2e ... S.D. for fuel 2,650 ft.
Jordan Drlg. Co.'s No. 6 Cole, 1,596 ft. W, 2,388 ft. N, NE cor., Sec. 49, in Sec. 80-18-4e ... Location.
Jordan Drlg. Co.'s No. 2 Perebrook, 1,207 ft. W, 264 ft. S, C, Sec. 9-18-4e ... Location.
Jordan Drlg. Co.'s No. 1 School Board, 216 ft. S, 244 ft. W, NE cor. NW, Sec. 16-18-4e ... Location.

RED RIVER PARISH

W. D. Ball's No. 1 Krumholtz, 660 ft. S, 660 ft. E, NW cor., Sec. 32-14-10 ... S.D. account high wtr. 1,550 ft.
LeGrande et als' No. 1 Sample, Sec. 11-14-11 ... Rigging up.

RICHLAND PARISH

Austin & McDonald's No. 1 Hunt, 594 ft. N, 660 ft. E, SW cor., Sec. 13-17-5 ... Derrick.
Austin & McDonald's No. 2 Millsaps, SW cor., Sec. 17-17-6 ... Waiting orders; T.D. 2,679 ft.
Austin & McDonald's No. 3 Millsaps, 1,980 ft. S, 660 ft. E, NW cor., Sec. 16-17-6 ... Tested S.W; W.O. 2,477 ft.
Austin & McDonald's No. 4 Millsaps, NW cor., Sec. 16-17-6 ... Location.
Austin & McDonald's No. 5 Millsaps, 2,640 ft. N, 1,320 ft. W, SE cor., Sec. 8-17-6 ... Derrick.
W. C. Feazel's No. 1 Landrum, 620 ft. N, 4,573 ft. E, SW cor., Sec. 6-16-7 ... Derrick.
Industrial Gas Co.'s No. 1 T. R. Hodge, 3,259 ft. E, 1,320 ft. S, C, Sec. 7-16-7 ... Fishing 3-in. drill stem; T.D. 2,874 ft.
Industrial Gas Co.'s No. 1 A. T. Davidson, 1,350 ft. S, 916 ft. E, NW cor., Sec. 6-16-7 ... S.D; W.O. 2,762 ft.
Industrial Gas Co.'s No. 1 Ruston Drlg. Co., 1,930 ft. S, 1,955 ft. E, NW cor., Sec. 7-16-7 ... S.D; W.O. 2,636 ft; igneous rock.
Richland O. & G. Co.'s No. 1 Singleterry, 1,930 ft. N, 660 ft. W, SE cor., Sec. 20-18-7 ... Cmtd. 9-in. csg. 970 ft.
Shreveport Contractors, Inc.'s No. 1 Buie, 600 ft. E, 400 ft. N, SW cor., Sec. 17-15-7 ... S.D; shale and boulders 2,527 ft.

SABINE PARISH

Benedum & Trees' No. 1 Sabine Lbr., 330 ft. N and E, C, Sec. 34-8-12 ... Location.
Benedum & Trees' No. 7 Bowman-Hicks, 330 ft. S and W, NE cor. NW, Sec. 34-7-12 ... Location.
G. A. Henshaw et als' No. 1-A Sabine Lbr. Co., 200 ft. N, 760 ft. E, SW cor. SE NE, Sec. 31-8-12 ... Location.
G. A. Henshaw et als' No. 2-A Sabine Lbr. Co., 200 ft. N and E, SW cor. SE NE, Sec. 31-8-12 ... Location.
G. A. Henshaw et als' No. 3-A Sabine Lbr. Co., 766 ft. N, 200 ft. E, SW cor. SE NE, Sec. 31-8-12 ... Location.
G. A. Henshaw et als' No. 1-B Sabine Lbr. Co., 150 ft. S and E, C, Sec. 31-8-12 ... Location.
C. L. Jett, trustee's No. 1 Jones, 150 ft. C, Sec. 31-8-12 ... Location.
O'Brien Bros.' No. 1 Colquitt, 330 ft. S and E, NW cor. SW, Sec. 32-8-12 ... Location.
Ohio Oil Co.'s No. 3 Bowman-Hicks, 330 ft. S and W, NE cor. SE SW, Sec. 33-8-12 ... Location.
Ohio Oil Co.'s No. 4 Bowman-Hicks, 330 ft. N and E, SW cor. NW SW, Sec. 35-8-12 ... Location.
C. E. Simmons' No. 1 Bolin, 116 ft. E, 126 ft. N, C, Sec. 31-8-12 ... Location.
Bridges-Clark Oil Co.'s No. 1 Gay et al, 300 ft. S, 300 ft. E, NW cor. NE NW, Sec. 3-9-12 ... Drlg. 2,912 ft.
Bridges-Clark Oil Co.'s No. 1 McWilliams, 330 ft. S, 330 ft. E, NW cor., Sec. 30-10-11 ... Drlg. 2,070 ft.
G. M. LeGrand's No. 1 A. C. Haley, 1,020 ft. N, 3,300 ft. E, NW cor., Sec. 6-7-12 ... Arranging test 2,480 ft.
Lohman et als' No. 1 Wyatt Lbr. Co., 150 ft. S, 330 ft. E, NW cor. NE SW, Sec. 18-4-11 ... Derrick.
Paramount O. & G. Co.'s No. 1 Wootems, 330 ft. N, 330 ft. W, SE cor. NE NW, Sec. 11-6-12 ... Derrick.
Pelican O. & G. Co.'s No. 1 La. Long Leaf Lbr. Co., 215 ft. N, 30 ft. E, SW cor. NW SE, Sec. 4-7-11 ... Derrick.
Pelican O. & G. Co.'s No. 1 Sabine Lbr. Co., 330 ft. S, 330 ft. E, NW cor. NE SW, Sec. 1-7-12 ... Rig up.

D. H. Riddick's No. 1 Scretchfield, 400 ft. E, 400 ft. N, SW cor. NW SE, Sec. 18-9-12 ..... S.D. 2,300 ft.
A. H. Tarver's No. 2 Long Bell, 800 ft. N, 800 ft. W, SE cor. SW, Sec. 18-8-13 ..... Drlg. 2,260 ft.

TENSAS PARISH

A. R. Willis et als' No. 1 Curry, 1,320 ft. S, 1,320 ft. E, NW cor., Sec. 39-11-12 ..... S.D. 600 ft.

UNION PARISH

Bahan & Bahan's No. 1 J. West, 660 ft. N, 660 ft. E, SW cor. SE, Sec. 33-23-3 ..... D.S. test; dry 2,348 ft; arranging to deepen.
Interstate Nat. Gas Co.'s No. 26 fee, 2,970 ft. S, 660 ft. E, NW cor., Sec. 33-23-3 ..... Drlg. 2,200 ft.
Fred Stovall's No. 1 Stovall, 1,820 ft. E, 350 ft. N, SW cor., Sec. 32-23-4 ..... Rig up.
United Carbon Co.'s No. 1 McInnis, 660 ft. N and E, SW cor. SE, Sec. 19-20-4e ..... Location.
E. W. Bateman's No. 3 Womble, 200 ft. S, 660 ft. E, NW cor. NW SW, Sec. 1-22-11 ..... Location.

WEBSTER PARISH

F. M. Fuller's No. 1 Monzingo, 200 ft. N, 200 ft. W, SE cor., Sec. 27-18-8 ..... Began drlg. Nov. 10; cmtd. 10-in. 62 ft.
Paul C. Warren et als' No. 1 Martin, 305 ft. N, 212 ft. E, SW cor., Sec. 20-20-9 ..... Dry and abd. 2,171 ft.

WEST CARROLL PARISH

H. L. Hunt, Inc.'s No. 1 R. E. Brown, NW cor. NW SW, Sec. 4-21-11 ..... Set 10-in. 162 ft; drlg. 1,060 ft.
Palmer Corp.'s No. 1-A Marston, 1,320 ft. S, 89 deg., 35 min. W, 1,320 ft. of SE cor., Sec. 11-19-10 ..... Drlg. 2,670 ft.

ARKANSAS

ASHLEY COUNTY

Ark. Fuel Oil Co.'s No. 1 Crossett Lbr. Co., 330 ft. E, 330 ft. S, NW cor., Sec. 1-19-7 ..... Drlg. red shale 3,450 ft.

CLEBURNE COUNT

Cosden Oil Co. of Ark.'s No. 1 Donophan, 100 ft. S, 660 ft. E, NW cor. SW SE, Sec. 19-9-10 ..... Drlg. shale and shell 1,710 ft.
Donnelly-Craver et als' No. 1 Doniphan Lbr. Co., SE cor. NW, Sec. 33-11-9 ..... Began drlg. Dec. 30; S.D. 60 ft. account cold weather.

COLUMBIA COUNTY

Parker et als' No. 1 Franks, 330 ft. S, 330 ft. W, C, Sec. 25-19-22 ..... S.D. 2,835 ft.
Williams et als' No. 1 Fullenwider, 200 ft. N, 600 ft. E, SW cor. NE SE, Sec. 12-17-22 ..... Rigging up.

DREW COUNTY

McClintock & Goodka's No. 1 Ogles, 920 ft. W, 400 ft. S, NE cor., Sec. 35-13-5 ..... S.D. repairing rig 1,810 ft.

FAULKNER COUNTY

Gold Creek O. & G. Co.'s No. 2 Stermer, SE cor. NW SE, Sec. 17-4-13 ..... Began drlg. Dec. 12.

GARLAND COUNTY

Givens et als' No. 1 Garrett, 660 ft. S, 660 ft. W, C, Sec. 1-3-19 ..... Drlg. gray sandy lime 3,402 ft.

LITTLE RIVER COUNTY

A. L. Buck's No. 1 Greason, NW NW, Sec. 25-12-32 .... S.D. 2,330 ft.
McDonald & Shaw's No. 1 W. E. Black, 240 ft. N, 450 ft. W, SE cor. SE NE, Sec. 12-13-28 ..... S.D. 1,965 ft.

LOGAN COUNTY

M. W. Greeson's No. 1 C. S. Parke, 330 ft. N, 330 ft. W, SE cor., Sec. 21-8-24 ..... Location.

MADISON COUNTY

Phillips Pet. Co. and F. S. Craver's No. 1, C, Sec. 11-14-28. Tested 250,000 ft. gas 63 ft; drlg. 1,461 ft.

OUACHITA COUNTY

Anderson & Wimmer's No. 1 Buck, Sec. 7-15-17 ..... D.S. test 2,680-90 ft; dry; drill stem stuck; T.D. 2,727 ft.
Artex Oil Co.'s No. 1 M. V. Smith, 330 ft. S, 330 ft. E, NW cor. SE NW, Sec. 31-15-17 ..... S.W. 3,077 ft; drlg. 3,166 ft; T.A. 3,188 ft.
Copenhaven et als' No. 1 Warnick, Sec. 2-15-17 ..... T.A. 2,190 ft.
Kobler & Erickson's No. 1 Rumph & Tyson, 300 ft. N, 300 ft. W, SE cor., Sec. 13-15-15 ..... Set 10-in. 98 ft.
A. P. Smith et als' No. 1 Reynolds, C SW NW, Sec. 21-14-17 ..... Cmtd. 6-in. 1,711 ft; T.D. 1,747 ft.

PIKE COUNTY

Theo. Davis, trustee's No. 1 Ruth Wilson, 200 ft. S, 200 ft. W, NE cor., Sec. 25-5-26 ..... S.D; funds; T.D. 713 ft.

POPE COUNTY

Ark.-La. Pipe Line Co.'s No. 1 Harms, 622 ft. S, 628 ft. W, NE cor. NE NW, Sec. 22-9-21 ..... Drlg. 1,825 ft.
Ark.-La. Pipe Line Co.'s No. 1 Crutcher, 330 ft. S, 450 ft. E, NW cor. NE NW, Sec. 14-9-21 ..... Location.
Cosden Oil Co.'s No. 1 Mo. Pac. R.R., 660 ft. N, 660 ft. E, SW cor. NW SE, Sec. 13-9-19 ..... Arranging to cmt. 12½-in. 2,500 ft.

PRAIRIE COUNTY

Transcontinental Oil Co.'s No. 1 Louis Novak, 330 ft. E, 330 ft. N, SW cor. SW NE, Sec. 36-2n-6 ..... Reaming to bottom 2,930 ft.

ST. FRANCIS COUNTY

Brownlee Drlg. Co.'s No. 1 Whitted, 110 ft. N, 110 ft. E, SW cor. SE NW, Sec. 28-4-1 ..... S.D.; funds; 300 ft.

UNION COUNTY

Johnson Drlg. Co.'s No. 1 Tate, 300 ft. N and W, SE cor. NE NW, Sec. 14-18-14 ..... Location.
Al-Cal Oil Corp.'s No. 1 Harvey, 660 ft. W, 300 ft. S, NE cor. SW SE, Sec. 1-17-16 ..... Drlg. 2,463 ft.
Bredham et als' No. 1 Craig, SW cor. NW NE, Sec. 6-18-15 ..... Running sand pump; T.D. 2,200 ft.
W. M. Coates, trustee's No. 1 McDuffie, Sec. 32-19-17.. T.A. in red beds; T.D. 4,506 ft.
O. W. Estes' No. 1 Felsenthal, 330 ft. S, 330 ft. W, NE cor. NE NW, Sec. 2-18-15 ..... Pulled liner; S.D; W.O. 2,230 ft.
O. W. Estes' No. 1 Telford, 320 ft. S, 320 ft. E, NW cor. SW, Sec. 35-17-14 ..... Drlg. 2,468 ft.
Federal Pet. Co. and Union Sawmill Co.'s No. 1 fee, 330 ft. N, 330 ft. W, SE cor. NW NE, Sec. 9-18-13.. Derrick.
Lion Oil Ref. Co.'s No. 1 Ballard, 330 ft. N, 330 ft. W, SE cor. SW NW, Sec. 10-18-13 ..... Drlg. 1,805 ft.
Marine Oil Co.'s No. 1 Simmons, 200 ft. N, 200 ft. W, SE cor. SE NW, Sec. 10-18-13 ..... Rigging up.
Marine Oil Co.'s No. 2 Simmons, 300 ft. N, 300 ft. E, SW cor. SE NW, Sec. 10-18-13 ..... Rig up.
Marine Oil Co.'s No. 2-B Winn, 200 ft. S, 200 ft. E, NW cor. NW SE, Sec. 10-18-13 ..... Rig up.
Modisette et als' No. 1 Union Sawmill Co., 330 ft. N, 330 ft. E, SW cor. NE NE, Sec. 14-18-14 ..... 10-in. 135 ft; drlg. 1,550 ft.
Johnson-Gummer Co.'s No. 1 Cargile, Sec. 4-18-15 ..... O.W.D.D; arranging to deepen; T.D. 3,341 ft; dry and abd. Oct. 2, 1929.
Stark et als' No. 1 Ainsworth, NE cor. NW NE NE, Sec. 8-19-16 ..... S.D. 2,405 ft.

VAN BUREN COUNTY

Glenn Cole et al, trustees' No. 1 Scanlan, 200 ft. S, 200 ft. W, NE cor. SE NW, Sec. 5-19-13 ..... S.D. 50 ft.

WASHINGTON COUNTY

Delbert & Graves' No. 1 Cunningham, Sec. 14-15-32 .... S.D. repairing pump; T.D. 550 ft.
O'Hara & Shetterly's No. 1 Boyd, SE cor. SE NE, Sec. 12-16-32 ..... Spudded Sept., 1928; S.D. 140 ft; resumed drlg. Aug. 25; U.R; T. D. 150 ft.
C H. Willoughby's No. 1 Jones, Sec. 34-16-30 ..... Trying to kill wtr. flow 2,150 ft; hard sand showing oil 1,637-40 ft.
Lincoln Leaseholding Synd.'s No. 1 Lincoln, Sec. 30-15-32 ..... U.R. 8-in. to T.D. 1,500 ft.

WHITE COUNTY

Letona Synd.'s No. 1 Letona, SE cor. NW SW, Sec. 35-9-8 ..... Cmtd. 5 3/16-in. 3,500 ft; drlg. 3,605 ft.

EAST TEXAS

CAMP COUNTY

Rogers et als' No. 1 Enfelt, R. M. Montgomery Sur. .... Tested dry 1,870 ft; S.D. 1,920 ft.

RED RIVER COUNTY

D. M. Buffington's No. 1 Hossler, E. Hughhart Sur. .... Drlg. 2,050 ft.
Shad Harper's No. 1 W. R. Garland, J. Wagley Sur. .... S.D. 1,862 ft.
Johnson Pet. Co.'s No. 2 Randolph, Edward Dean Sur... S.D. 2,000 ft.

SHELBY COUNTY

Benedum & Trees Oil Co.'s No. 1 McCann, D. G. Green Sur. ..... Drlg. 2,045 ft.
Chapperall Oil Co.'s No. 2 Holt, Matthew Moore Sur. .. S.D. for orders 3,004 ft.

MISSISSIPPI

ALCORN COUNTY

Alcorn Pet. Co.'s No. 1 Matthews, SE cor., Sec. 14-2s-7e.. Arranging to shoot 2,520-60 ft; T. D. 2,735 ft.

CHICKASAW COUNTY

Hightower & Golson's No. 1 Flemming, NE cor., Sec. 20-13-3 ..... Driving 8¼-in. through quicksand; T.D. 1,280 ft.

HINDS COUNTY

Oscar Brown's No. 1 Riverside (formerly Hennessee et als') SE cor. SE SW, Sec. 23-16-5 ..... Set 12½-in. 30 ft; S.D. 1,050 ft.
Jackson O. & G. Co.'s No. 1 Mayes, Sec. 2-5-1e ..... Estimated 2,000,000 ft. gas 2,000 bbls. wtr; S.D; T.D. 2,480 ft.
Mrs. Reeder et als' No. 1 State, SE cor. NW NW, Sec. 25-6-1e ..... W.O; T.D. 2,905 ft.

HUMPHREYS COUNTY

E. C. Steele et als' No. 1 C. B. Box, SE cor. SE NE, Sec. 25-14-4w ..... Set 12½-in. 60 ft; S.D.

LAUDERDALE COUNTY

Lauderdale O. & G. Co.'s No. 1 Lackey, 990 ft. S and E, NW cor. NE, Sec. 2-7-16 ..... Set 8¼-in. 2,792 ft; T.D. 2,816 ft. sand 2,803-14 ft; W.O.
Meridian O. & G. Co.'s No. 1 Hauser, Sec. 33-8-18 ..... S.D.; green sand 2,698 ft.
J. R. Smith Oil Co.'s No. 1 C. F. Craig, Sec. 2-6-14 .... Derrick.

LAFAYETTE COUNTY

Banks-Goode et als' No. 1 May, 113½ rods S, 26 rods E, NW cor. SW, Sec. 22-10-1w ..... Derrick.

LINCOLN COUNTY

Lincoln O. & G. Co.'s No. 1 Pat Case, NE NE, Sec. 21-8-6 ..... S.D; W.O. 2,221 ft.

MONROE COUNTY

Amory Dev. Co.'s No. 1 Bourland, Sec. 2-13-19 ..... S.D. 2,912 ft; bailer lost in hole.
Amory Pet. Co.'s No. 1 Hall, Sec. 8-13-19 ..... Bailing to test oil and gas show; T.D. 2,387 ft.
Park Bowser et als' No. 1 Cowart, second hole, Sec. 2-12-19 ..... S.D. 30 ft.

RANKIN COUNTY

Gulf Ref. Co.'s No. 1 Rainey, NW NW, Sec. 13-5-1e .... Rigging up.

WARREN COUNTY

El Dorado Oil Co.'s No. 1 Dornbush, Sec. 8-18-15 ..... Waiting for 6-in. to set; over 2,350 ft. stuck; D.S.; T.D. 2,475 ft.

YALOBUSHA COUNTY

Carter Oil Co. and J. D. Collett's No. 1 Blackmur, 330 ft. S, 990 ft. W, C, Sec. 14-11-4 ..... Fishing drill stem; T.D. 2,433 ft.

YAZOO COUNTY

Amerada Pet. Corp.'s No. 1 Doherty, SW SW, Sec. 24-12-2 ..... Drlg. 3,900 ft.

ALABAMA

LAMAR COUNTY

Briggs & Knapp's No. 1 Wefel, Sec. 25-12-14 ..... Drlg. hard lime 1,730 ft.

LAUDERDALE COUNTY

A. D. Morton et als' No. 10 O'Neal estate, Sec. 8-2s-13w. Rigging up cable tools.

MARION COUNTY

Hobson et als' No. 1 John Clark, SE, Sec. 29-11-14 ..... Derrick pattern.

WASHINGTON COUNTY

S. A. Hobson's No. 1 Hobson Bros., Sec. 9-8-2 ..... S.D; S.W. flow at 1,450 ft.
S. A. Hobson's No. 1 Wilson, Sec. 27-7-1 ..... Fishing bailer; T.D. 881 ft.

WILDCAT OPERATIONS IN SOUTHWEST TEXAS

(Continued from Page 71)

CALDWELL COUNTY

W. E. Allaun and Calco Pet. Co.'s No. 1 Martin ..... T. D. 2,920 ft.; preparing to shoot.
Keen & Malcolm's No. 1 Mollie McNeal, George C. Kimball Sur., 2,500 ft. to W line, 860 ft. to N line, 1 mile S from old Luling Field ..... T. D. 1,450 ft.; drlg. in shale.
Humble Oil & Ref. Co.'s No. 4-B J. R. Tiller, south central part of lease in the J. Hinds Sur. ..... Location.
San Antonio Petroleum Corp.'s No. 1 Gustave Walkerhagen, Thomas Maxwell Sur., 150 ft. to NW and SW lines, 11 miles W from Lockhart ..... T. D. 1,425 ft.; shut down in Edwards.
G. R. McIntire's No. 1 J. G. Towns in the I. Weldon Sur., 4,900 ft. to NE line, 1,350 ft. to SE line of Sur. ..... T. D. 2,630 ft. in chalk; shut down.
Cranfill & Reynolds' No. 1 M. L. Stroun, 150 ft. from SE and SW line of farm of Pablo Martenz Sur. .... T. D. 1,900 ft.; drlg. in chalk.
Trinity Drillers' No. 1 McMullen, 2,125 ft. from NE line, 150 ft. from NW line of Sur., Gibson Betty Sur. .... Spudded in.

DEWITT COUNTY

Gibson & McIntyre's No. 1 William Van Roeder ..... T. D. 1,480 ft.; shut down.
F. P. Zoch's No. 1 Steinman, John Garelli Sur., 976 ft. from SW line, 1,797 ft. from NW line ..... T. D. 4,610 ft.; abandoned dry.
H. T. Roe's No. 1 Leinhardt ..... T. D. 1,750 ft.; shut down.

DIMMITT COUNTY

Texas Fuel Gas Co.'s No. 1 City Natl Bank (Laxon) .... T. D. 680 ft.

DUVAL COUNTY

T. W. Callahan and W. M. Howard's No. 1 J. M. Luby, 3,960 ft. N line, 3,960 ft. W line Sur. 24 ..... Location.
National Oil Co.'s No. 2 Ball, Agua Poquita Sur., Blk. 3.. T. D. 3,065 ft.; drlg.
F. P. Zoch's No. 1 King, Blk. 25, Hoffer and Smith Subd., W. R. King ranch, Diego Hinijosa grant, 660 ft. N line, 660 ft. E line ..... T. D. 3,354 ft.; drlg. in hard rock.
Southern Oil Co.'s No. 1 Welder Wood, Sur. 215 ..... T. D. 750 ft.; standing waiting on water.

EDWARDS COUNTY

A. M. Griffith's No. 1 Wardlaw ..... Dropped from reports until work is resumed.
Phillips Pet. Corp.'s No. 2 A. G. Holman, 330 ft. from N and E lines of SE of tract, C.C.S.D.&N.G.R.G. Sur. No. 25 ..... Location.

FRIO COUNTY

Frank B. LeFeure's No. 1 H. W. and R. L. Eschenburg, Edward Gallagher Sur. No. 789, 3,980 ft. W of SE cor. of Edward Gallagher Sur. No. 788 and 1,320 ft. S of N line of Edward Gallagher Sur. No. 789 ..... Rigging up.

GOLIAD COUNTY

Wm. F. Morgan's No. 1 George Ray in Pedro Trevano Sur., 150 ft. from SE and NW line of George Ray 627-ac. tract ..... T. D. 1,622 ft.; drlg. in gumbo and shale.
Humble Oil & Ref. Co.'s No. 1 Lackey & Weldon, 2,000 ft. from SE and SW lines of the Lackey & Weldon 1,000-ac. tract out of the most SW cor. thereof in the Javiano Gomez Sur. ..... Location.

GONZALES COUNTY

Acme Oil & Royalty Corp.'s No. 1 Weber, Thomas Wright Sur. ..... T. D. 2,220 ft.; drlg. in sandy shale.

Cullen & West's No. 1 F. O. Menking, 875 ft. from N line, 1,755 ft. from W line of tract in the Gonzales Sur. ..... Location.

Fitzsimmons & Perrinot's No. 1 Z. Huber, 2,100 varas from NW line, 1,450 varas from NE line (river) of survey, 2¾ miles SE of Darst Creek in Stephen Smith Sur. ..... T. D. 1,955 ft.; drlg. in Taylor marl.

Alice R. Garrett's No. 1 W. H. Cardwell, 150 ft. from SW line, 1,650 ft. from SE line of Sur., 12 miles S from Gonzales in the Byrd Lockhart Sur. ..... Spudded and shut down.

Adams & Lyles' No. 1 Jackson Sur. ..... T. D. 1,971 ft.; dry and abandoned.

Finnell & Elam's No. 1 Robinson, Liverpool Sur. ..... T. D. 1,720 ft.; to resume drlg.

GUADALUPE COUNTY

Adams & Lyles' No. 1 Hoffman, 250 ft. S of N line, 350 ft. E of NE cor. of John Sowell Sur. in Green DeWitt Sur., 5 miles NW from Darst Creek ..... T. D. 2,490 ft.; drlg. in chalk.

L. M. Conner et al's No. 1 Tom Havbirth (212-ac.), 1,000 ft. from NE line, 4,500 ft. from NW line of the Robert Hall Sur. ..... Location.

Turman et al's No. 1 St. Charles, 150 ft. N line, 300 ft. from W line of Sur., 5 miles SW of Grayburg's No. 1 Wells, SE cor. of county in the J. A. Miller Sur. ..... T. D. 1,675 ft.; drlg. in shale.

Trinity Drillers' No. 1 J. M. White, 975 ft. from NE line, 750 ft. from SE line of 166-ac. farm in the Mich Miller Sur. ..... T. D. 600 ft.; drlg. in sandy shale.

HAYS COUNTY

E. A. Bucklin's No. 1 A. Elsner ..... T. D. 2,475 ft.; granite wash; abandoned.

John H. Foster, trustee's No. 2 W. G. Barber, 7 miles SE of Buda ..... T. D. 671 ft.; shut down.

JIM WELLS COUNTY

E. W. Ogden's No. 1 G. Farris, M. Perez Sur. ..... T. D. 2,615 ft.; shut down.

KARNES COUNTY

Ruby & Claypool's No. 1 Tom V. Zepeda Sur., 850 ft. N line, 1,600 ft. E line ..... Install new rotary at 1,238 ft.

Hurador Oil Co.'s No. 1 W. E. Porter ..... T. D. 3,400 ft.; installing new rotary.

KENDALL COUNTY

Borgett et al's No. 1 Haag, W. Avery Sur. ..... T. D. 600 ft.; corrected depth; pulled csg.; reaming.

Dixon Oil Co.'s No. 1 Ottmer Behr, W of H.T.&B.R.R. Sur., 3½ miles SE from Sisterdale ..... Rigging up.

Sterling's No. 1 Willie Werner, 2 miles NW from Borgett No. 1 Haag ..... T. D. 919 ft. (corrected); putting on pump.

KERR COUNTY

Mashe and Tunstill's No. 1 Love Ranch, 1,000 ft. from W line of Sec. 1,594, 100 ft. S of S line of Sec. 1,597 in the G.C.S.D.&R.G.N.G. Sur. ..... Moving in.

KLEBERG COUNTY

Bowen-Sarles' No. 1 Robert H. Simmons, Sec. 7, King Subd., 3 miles W from Ricardo ..... T. D. 415 ft.; standing.

KINNEY COUNTY

Lloyd Oil Co.'s No. 1 G. B. Moore, Sur. 117 ..... T. D. 3,000 ft.; producing sulphur water.

A. Blume et al's No. 2 Herbst, 1,731 ft. W and S lines of Sur. in the Poindexter-Burns Sur. ..... Rigging up cable tools.

Mardon Oil Co.'s No. 2 Jim Clamp, in the John Winters Sur. No. 346, near No. 1 ..... Spudded in.

LAVACA COUNTY

McElreath & Suggett's No. 1 Julius Heinshohn, 361 ft. to E, 523 ft. to S line of farm in the G.W.& W.H. Sur. ..... Derrick.

LEE COUNTY

Byrd et al's No. 1 H. L. Bastle, 1,200 ft. N and 1,000 ft. E of 80-ac. tract of Wm. Johnson ..... T. D. 3,612 ft.; shut down; hole full of water.

Texas-Louisiana Carbon Corp.'s No. 1 Bryan, in the S. F. Austin Sur., 1,200 ft. N and W of 1,200-ac. farm ..... T. D. 3,380 ft.; drill stem stuck.

Todor Oil Corp.'s No. 1 H. Zsesch, in the J. Meeks Sur., 150 ft. N and 900 ft. W of S. Meeks Sur. .... T. D. 2,000 ft.; shut down.

LIVE OAK COUNTY

O'Neil & Catlett's No. 1 Smith, 900 ft. SW line, 150 ft. NW line ..... T. D. 4,100 ft.; drlg. in shale; tested 3,500 ft. salt water at 3,950 ft.

Dr. J. K. Rowan Co.'s No. 1 Lynne Ranch, 171 ft. W of George West ..... Location.

Simmons Oil Co.'s No. 1 Richard Coquat, in James C. Hill Sur., 2,250 ft. to S line, 1,750 ft. to E line, 7 miles NE of Oakville ..... T. D. 4,000 ft.; drlg. in gumbo and shale.

MAVERICK COUNTY

Rycade Oil Corp.'s No. 6 Chittim, 1,455 ft. from S, 320 ft. from W of Sec. 116, Blk. 7, L&G.N. Sur. ..... Rigging up.

Rycade Oil Corp.'s No. 5 Chittim ..... T. D. 3,442 ft.; standing; hole full sulphur water.

Rycade Oil Corp.'s No. 5 Sullivan, in C of Sec. 82, Blk. 7, in the L&G.N. Sur. ..... T. D. 535 ft.; drlg. in chalk.

Rycade Oil Corp.'s No. 3 Chittim, Blk. 7, Sur. 116, H.& G.N., 175 ft. N of No. 1, 10 ft. W, 225 ft. S line .... T. D. 6,636 ft.; shut down for orders.

MEDINA COUNTY

Pat Armstrong's No. 1 C. W. Butts in George C. Hanson Sur. ..... T. D. 1,102 ft.; shut down.

Pan American Pet. Co.'s No. 1 Antoine Hart in Harrison Sur. No. 799, 15 miles S from Hondo ..... Laying gas line to rig.

Donaldson Oil & Dev. Co.'s No. 2 Adams Co., James Hillemmeyer No. 25 Sur., 500 ft. to E line of Sur., 150 ft. to S line of N half of Sur. ..... Rig up.

F. E. Tegler's No. 6 J. P. Nixon, NW cor. J. J. Durst Sur. No. 14 ..... Location.

Pat Armstrong's No. 1 Crawford, 1,389 ft. N line, 2,550 ft. E line of Sur., 478.6 miles W from Devine ..... Rigging up.

Pearson Oil Co.'s No. 4 Mangold, 1,600 ft. W of E line, 1,800 ft. N of S line of Sur. in the I. S. Palmer Sur. No. 20, south from Noonan ..... T. D. 765 ft.; waiting on cement.

Mid-Kansas-Gulf's No. 1 Jessie Newton, 150 ft. E of W line, 750 ft. N of S line of 624-ac. tract, E one-third of Maximo Bernaid Sur. 762, 15 miles SW from Hondo ..... T. D. 1,400 ft.; drlg. in chalk.

Pure Oil Co.'s No. 1 Nick F. Fahn in Amos Hudson Sur. No. 587, near NW line of Sur. ..... Reaming hole to set casing.

Cecil Switzer's No. 1 Zerr, 6 miles west of Hondo ..... T. D. 3,710 ft.; fishing for tools.

R. C. Hill's No. 1 A. Wurzbach, G. Areola Sur., 500 ft. E line, 600 ft. S line ..... Location.

MILAM COUNTY

Service Oil & Gas Co.'s No. 1 Muldrow, L. Taylor Sur., SE cor. ..... Location.

Hill & Bonwell's No. 1 B. Booker, James Welch Sur. .. Fishing 2,020 ft.

Lloyd Oil Corp.'s No. 1 San Clement, Fokes Sur. ..... Spudded in.

A. H. Wray's No. 1 D. D. Fowler ..... T. D. 1,688 ft.; sidetracked 360 ft. of drill pipe lost in hole; now drlg.

McMULLEN COUNTY

Cowboys Oil Co.'s No. 1 Shiner, H. M. Brewer Sur. .... T. D. 2,610 ft.; drlg. in gumbo.

Southern Crude Oil Purch. Co.'s No. 1 J. B. Baker, 2,310 ft. from S and E lines of Sec. 7 in the F. M. Lowe Sur. ..... T. D. 2,160 ft.; drlg. in hard gyp rock.

NUECES COUNTY

H. Grimm et al's No. 1 A. R. Roberts, Blk. 79, Winter Vegt. Garden Subd., 6 miles NW of Robstown, 12 miles NE Agua Dulce Field ..... T. D. 2,503 ft.; drlg. in sandy shale.

SAN PATRICIO COUNTY

LaFeria Oil & Gas Co.'s No. 1 C. C. Smith in J. C. White Sur., 690 ft. to N line, 350 ft. to E line ..... T. D. 2,252 ft.; waiting to bail.

STARR COUNTY

Smith & Adams' No. 1 Welch, Perdernal Sur. ..... Standing at 757 ft.; sand showing gas.

UVALDE COUNTY

Waldrop & Welch's No. 1 H. S. Benson, 2 miles NW of Uvalde ..... T. D. 770 ft.; set csg.; waiting on cement.

Phantom Oil Co.'s No. 1 Claudt, Sur. 661 ..... Derrick.

WILLACY COUNTY

Weimer-Richardson's No. 1 Elmore ..... T. D. 1,860 ft.; shut down in gumbo.

WILLIAMSON COUNTY

Harlem et al's No. 1 H. H. Stiles, in the J. Bevil Sur., 220 ft. N and 330 ft. E of Sur. ..... Rigging up.

Fred Beaty's No. 1 H. Bland, 450 ft. from N line, 1,000 ft. from E line of tract in the P. Coursey Sur., 1 mile east from Taylor ..... T. D. 1,176 ft.; shut down.

E. L. Chapman's No. 1 Fox in the S. Miller Sur. ..... T. D. 100 ft.; drlg.; set 26 ft. 10-in. csg.

E. L. Chapman's No. 2 Fox, 150 ft. SW line, 750 ft. NW line of 93-ac. tract in the S. Miller Sur. ..... Derrick.

G. B. Peterman's No. 1 J. C. Abbott, 310 ft. from E line, 30 ft. from S line of tract in the S. Miller Sur. ..... Location.

G. B. Peterman's No. 2 J. C. Abbott, 450 ft. from S and W line of Abbott 100-ac. tract in the Simon Miller Sur., SE from Thrall ..... Rigging up.

McNeil et al's No. 1 R. L. Abbott, 330 ft. NW line, 150 ft. NE line of Abbott 15-ac. tract in the S. Miller Sur. ..... Derrick.

Powell & Kykendall's No. 1 Christian Mager in the W Byerly Sur., 150 ft. N and 450 ft. E of farms of 150 acres ..... Shut down 1,501 ft.

Scomyers Edwards et al's No. 1 J. C. Abbott, 88 ft. from N line, 300 ft. from E line of Abbott 100-ac. tract in the Simon Miller Sur., SE from Thrall .... Rigging up.

Simms Oil Co.'s No. 1 L. E. Lawrence, 150 ft. from N line, 150 ft. from W line of Lawrence 100-ac. tract in the Simon Miller Sur., SE from Thrall ..... T. D. 720 ft.; sand and boulders.

L. W. Wilson et al's No. 1 W. L. Lawrence, 150 ft. from W line and C N and S of 35-ac. tract or 1,400 ft. from SW line, 1,450 ft. SW line of H. Owens Sur. .. Building derrick.

WILSON COUNTY

Empire Gas & Fuel Co.'s No. 1 Shook, 1,350 ft. NW line, 7,100 ft. SW line Vincente Zepeda Sur. ..... T. D. 75 ft.; spudded in.

Rycade Oil Corp. et al's No. 1 George Hice, Juan Delgado Sur., 650 ft. W of Cibolo River, 150 ft. SE line of tract ..... T. D. 3,445 ft.; dry and abandoned; tested sulphur water.

ZAPATA COUNTY

John Pappas' No. 2 Cuellar, Por. 33 and 34 ..... T. D. 1,870 ft.; coring; shows gas.

National Oil Co.'s No. 1 D. B. Adams ..... T. D. 690 ft.; shut down; lack of water; making considerable gas.

ZAVALA COUNTY

Weigand Bros.' No. 1 W. L. Gates, Hooper & Wade Sur. No. 13, 1,320 ft. S of N line, 1,220 ft. W of NE cor. Sur., about 16 miles S of Batesville ..... T. D. 1,125 ft.; drlg. in shale.

Jack Baldwin's No. 1 J. R. Price, in the W. E. Erskin Sur. No. 34 ..... Spudded in and shut down.

Southern Crude Oil Purch. Co.'s No. 1 Nat M. Washer in the T. Pinckhardt Sur. No. 180, 1 deg. E, 6,795 ft. from SE cor. ..... T. D. 2,659 ft.; cored hard lime.

Ike Pryor's No. 1 Martha Campbell, 400 ft. from N line, 5,400 ft. from E cor. of Sur., Sec. 99, in the Martha Campbell Sur., 3½ miles NE from La Pryor.. T. D. 535 ft.; drlg.

Texas Fuel & Gas Co.'s No. 4 West Sur. 44 ..... T. D. 439 ft. (corrected); showing for 1,500,000 ft. gas.

Texas Fuel & Gas Co.'s No. 1 Matthews in upper Byrd Ranch ..... T. D. 1,205 ft.; drlg. in shale.

SOUTHWEST TEXAS

(Continued from Page 71)

from south line of tract, in the J. R. Robinson Survey; total depth 2,300 feet; drilling in chalk. Same company's No. 6 Dix-McKean, 445 feet from east line, 150 feet from south line of tract, in the J. R. Robinson Survey; total depth 2,100 feet; drilling in chalk. Same company's No. 7 Dix-McKean, 150 feet from south and east lines of tract, in the J. R. Robinson Survey; total depth 2,100 feet; drilling in Taylor. Same company's No. 8 Dix-McKean, 300 feet northeast of No. 3, in the J. R. Robinson Survey; total depth 2,100 feet; drilling in Taylor.

Humble Oil & Refining Co.'s No. 1 Baker, in the J. C. Darst Survey, 150 feet north line, 183 feet west line of tract; location. Same company's No. 2 Baker, 472 feet north line, 183 feet east line of tract; location. Same company's No. 10-A Denman, 1,100 feet from south line and 1,250 feet from west line of tract, in the A. S. Emmett Survey; derrick. Same company's No. 2 A. E. Dowdy, 150 feet from south line, 1,050 feet from east line of tract, in the J. C. Darst Survey; total depth 2,470 feet; drilling in Buda. Same company's No. 1 Sally Wilson, in the J. C. Darst Survey, 150 feet from north line, 183 feet from west line; location. Same company's No. 4 Sally Wilson, 500 feet east of No. 2, 150 feet north line of tract, in the Jacob Darst Survey; derrick. Same company's No. 5 Sally Wilson, 800 feet south of north line, 1,000 feet west of east line, in the Jacob Darst Survey; total depth 2,550 feet; drilling in Del Rio. Same company's No. 1 Yates-Wilson, in the Jacob Darst Survey, 150 feet from north and west lines of tract; location (corrected).

Jake Jarman and others' No. 1 Fee, 490 feet from north end of 20-foot strip off east end of D. D. Baker 60-acre tract, in the Jacob Darst Survey; total depth 2,550 feet; drilling in Georgetown; set casing.

Magnolia Petroleum Co.'s No. 7 Thomas Dix, 450 feet from southwest and northwest lines of 50-acre tract, in the J. R. Robinson Survey; total depth 1,500 feet; drilling in shale. Same company's No. 1 L. V. Echols, in the James Hodges Survey, 150 feet to northwest and southwest lines of farm, 3,650 feet to southwest, 3,220 feet to northwest of survey; total depth 2,715 feet; shut down; lack of water. Same company's No. 2 L. V. Echols, in the James Hodges Survey, 150 feet to southwest and southeast lines of lease, 300 feet southeast of No. 1 well, 164½-acre tract; total depth 2,845 feet; shut down; dry. Same company's No. 1 H. G. Goldman, 1,275 feet from northeast line, 150 feet from northwest line of farm, in the J. B. Alexander Survey; total depth 3,262 feet; drill stem stuck; will shoot off. Same company's No. 2 S. M. Roamel, 150 feet each way from northeast corner of 40-acre tract, in the James Hodges Survey; location.

Sun Oil Co.'s No. 3 Knoblock, 150 feet southeast line, 460 feet northeast line of 75-acre tract, in the J. R. Robinson Survey; total depth 2,165 feet; drilling in shale. Same company's No. 4 Knoblock, 150 feet northwest line, 460 feet northeast line 75-acre lease; total depth 2,160 feet; drilling in chalk. Same company's No. 5 Knoblock, 763 feet from southwest, 150 feet from southeast line, in the J.

W. Robinson Survey; total depth 2,250 feet; drilling in chalk.

Simms Oil Co.'s No. 3 C. W. Manford, 300 feet southwest of No. 1, 225 feet from southeast line; location.

Stroubie & Stroubie's No. 2 Rand Miller, 150 feet south from No. 1, in the J. B. Alexander Survey; location. Stroubie & Stroubie's No. 3 Rand Miller, in the J. B. Alexander Survey; location. Stroubie & Stroubie's No. 4 Rand Miller, 150 feet south of No. 3, in the J. B. Alexander Survey; location.

The Texas Company's No. 2 L. Anderson, in the Jacob Darst Survey, 150 feet to north and east lines; total depth 685 feet; shut down. Same company's No. 2 Dallas Wilson, 150 feet south and west lines of tract; spudded in and shut down. Same company's No. 3 Dallas Wilson, in the J. C. Darst Survey, 150 feet north of center of south line; location. Same company's No. 1-B Knoblock, 450 feet from southeast line, 450 feet southwest line of B lease, in the J. R. Robinson Survey; total depth 2,432 feet; drilling in Del Rio. Same company's No. 1-A Knoblock, 450 feet from northeast line, 150 feet from southeast line of A lease, in the J. R. Robinson Survey; total depth 2,526 feet; set casing. Same company's No. 2 W. R. Posey, 450 feet northeast line, 150 feet northwest line of lease, in the J. R. Robinson Survey; total depth 2,300 feet; drilling in chalk. Same company's No. 4 H. Willie, 390 feet north line, 330 feet east line of tract, in the J. Darst Survey; total depth 2,400 feet; drilling in Eagleford shale.

United North & South Development Co.'s No. 3 P. Roamel, in the J. R. Robinson Survey; shut down.

Dobrowolski Pool—Bexar County

Penn-Tex Oil Co.'s No. 1 Dobrowolski, 150 feet from south line, 150 feet from east line of west 67 acres of Dobrowolski 147-acre tract, in the M. Menchaca Survey; total depth 400 feet; drilling in shale.

Buchanan Pool—Caldwell County

Buchanan and others' No. 1 W. T. Cude, in the William Spillers Survey, 150 feet each way out of southeast corner of 23-acre W. T. Cude lease; total depth 2,013 feet; running casing; top Serpentine.

Pettus Field—Bee County

Union Producing Co.'s No. 5 George Ray, 1,750 feet southeast line, 250 feet northeast line of survey, in the Thomas Anson Survey, 3 miles northeast from Pettus, northeast offset to No. 1 McKinney; total depth 3,990 feet; oil sand 3,957-70 feet; oil shot over crown block when tester was opened; showed 1,500 feet of oil in drill stem on test; casing will be run. Same company's No. 6 Ray, 1,300 feet east line, 750 feet south line of survey, in the P. Miller Survey; total depth 4,456 feet; standing.

Lasater Field—Brooks County

Houston Oil Co.'s No. Holbein-Wormser, in the Palo Blanco de Maguellas Survey; 330 feet north line, 6,540 feet east line, direct offset 660 feet south of No. 1 Lasater; total depth 4,430 feet; drilling in Gyp lime.

Cartwright Pool—Live Oak County

Houston Oil Co.'s No. 2 J. B. Dunning, in the M. B. Kilvin Survey, 1,445 feet north of No. 1; total depth 4,919 feet; drilling in gumbo and lime.

Nursery Pool—Victoria County

Humble Oil & Refining Co.'s No. 3-A Jay J. Welder, in the D.L.&C. Survey, 1,634 feet southeast line, 736 feet southwest line, 1½ miles northeast from Nursery; total depth 5,896 feet; rigged up with heavy rig to drill deeper.

Cole Pool—Duval County

Magnolia Petroleum Co.'s No. 6 Servando Benavides, 330 feet northwest line, 380 feet northeast line, Block 7, Survey 174, O'Hern-Seacord subdivision; total depth 2,000 feet; drilling.

Kohler Pool—Duval County

Everett Suladie's No. 1 Peters, 165 feet south line, 230 feet west line, Survey 33; total depth 850 feet; drilling.

Allied Gas Co.'s (Pure) No. 2 Peters, 560 feet west line, 1,980 feet north line, Survey 161; total depth 1,743 feet; sand 1,740-43 feet; set 6⅝-inch casing at 1,740 feet. Same company's No. 1 J. T. Dinn, 1,500 feet south line, 1,500 feet east line, Survey 668; total depth 1,400 feet; drilling.

Humble Oil & Refining Co.'s No. 41 Kohler, 2,970 feet south line, 330 feet east line, Survey 165; location. Same company's No. 42 Kohler, 495 feet south line, 165 feet west line, Survey 171; total depth 1,758 feet; sand 1,751-58 feet; set 6⅝-inch casing 1,751 feet.

Schoolfield-O'Byrne—Duval County

C. E. Long's (Shell) No. 5 Hahl, 150 feet north line, 630 feet east line, Block 26, Survey 250; location.

Randado Pool—Jim Hogg County

Magnolia Petroleum Co.'s No. 1 Weil, Block 2, Survey 5, 660 feet north line, 349 feet east line; total depth 3,352 feet; drilling.

Roma Pool—Starr County

The Texas Company's No. 1-B V. C. de Guerra, 150 feet south line, 150 feet west line of north 1,173 acres, Share 92, Porcion 68 of Partition Porcion 67-68-69-70-71-72, Jurisdiction of Mier; total depth 750 feet; drilling.

Carolina-Texas Pool—Webb County

George S. Marshall's No. 2 Webster, 810 feet south line, 1,170 feet west line, Survey 684; total depth 900 feet; drilling.

W. R. Shankle's No. 2 Webster, Survey 684, 1,170 feet west line, 150 feet south line; rigging up.

Magnolia-Cole Pool—Webb County

Magnolia Petroleum Co.'s No. 4 Brennan-Benavides, in the Mariano Arispe grant, corner Blocks 16-17-52-53, Myrtle E. Hale subdivision; total depth 3,083 feet; set 5¾-inch casing at 3,070 feet; cleaning out 3,080 feet.

Cole Pool—Webb County

O. W. Killam's No. 18 Bruni, total depth 200 feet, drilling, set 10-inch casing at 100 feet.

E. H. Buckner's No. 1-A Rosa Benavides, 660 feet northwest line, 660 feet northeast line, Cole Petroleum Co. subdivision, Mariano Arispe grant, Block 5, Survey 14; total depth 1,582 feet; sand 1,576-82 feet; small gasser; drilling deeper.

W. E. May's No. 1 Volpe, 660 feet east line, 840 feet south line, Block 15, Survey 694; total depth 2,150 feet; drilling.

Allied Gas Co.'s (Pure) No. 1 Bruni, 200 feet southwest line, 450 feet northwest line, Mariano Arispe grant, Survey 7, Adams (Foltz) subdivision; total depth 2,269 feet; sand 2,260-63 feet tested 20,000,000 feet of gas, 396 pounds rock pressure; sand 2,263-69 feet, 30,000,000 feet of gas, 700 pounds rock pressure; set 6⅝-inch casing 2,259 feet.

Magnolia Petroleum Co.'s No. 1 S. Perez, Survey 460, J. Poitevent, 1,980 feet north line, 660 feet west line; total depth 5,393 feet; twisted off whipstocking out at 2,670 feet. Same company's No. 2 King-Harper, Block 2, Survey 323, 660 feet north and east lines; location.

Jennings Pool—Zapata County

Claggett & Blair's No. 2 Trevino, Block 2, Survey 66, 150 feet west line, 200 feet north line; total depth 1,254 feet; location surveyed and corrected. Claggett & Blair's No. 3 Trevino, 500 feet east line, 150 feet north line, Block 1, Survey 66; location.

A. L. Edgington's No. 1 Trevino, 150 feet south line, 150 feet east line, Block 26, Survey 412; total depth 50 feet; drilling.

Killam-Duggan's No. 12 Cuellar, 150 feet southwest line, 420 feet north line, Survey 278; total depth 1,390 feet; lost; skidded derrick and starting new hole.

O. W. Killam's No. 20 Cuellar, spudded in. O. W. Killam's No. 17 Cuellar, 600 feet north line, 940 feet east line 160-acre Cuellar tract out of 1,772-acre Cerrito Blanco grant; derrick.

R. F. Blankenship's No. 2 Garza, Block 2, Survey 413, 425 feet west line, 425 feet north line; total depth 150 feet; drilling. R. F. Blankenship's No. 2 Montemayor, 820 feet east line, 150 feet north line, Block 7, Survey 64; total depth 250 feet; standing.

CALIFORNIA FIELDS

(Continued from Page 80)

well, like No. 1, is also causing considerable anxiety because of heavy gas pressure. No. 2 More, bottomed at 4,327 feet with a string of 9-inch landed and cemented at 2,905 feet, suddenly built up a heavy gas pressure during the early part of the week and subsequently broke through the cement. The most interesting feature in connection with the pressure built up in this well is the fact that gas began issuing at several points along a fault for a distance of approximately 600 feet. This fault gave the General Petroleum trouble and, while drilling ahead at approximately 3,000 feet, circulation was completely lost. This void was subsequently mudded off, however, and drilling resumed. The situation resulting from the escape of gas at several points along the fault got so serious that the General Petroleum opened up No. 1 More in an effort to relieve the formation pressure. So far this has proven ineffective but some relief may be afforded at a later date.

The casing pressure on No. 1 More was approximately 500 pounds when the well was opened up but this subsequently increased to 1,100 pounds. While No. 1 More was opened up in an effort to relieve formation pressure, the company continued pumping in heavily fortified rotary mud in No. 2 in an effort to mud off the flow and permit the crew to run in a new string of pipe.

Capitan

The General Petroleum successfully finished another producing well in the Capitan Field of Santa Barbara County in the early part of the week and a check of development work indicates the probable completion of another within the next ten days. The General Petroleum's new producer, No. 3 Erburu, came in pumping at the rate of 80 bbls. per day but is at the present time making 190 bbls. of 20.8 gravity oil daily on the beam. This project was originally carried down to 1,603 feet but because of a gray sand found at that point, was subsequently plugged back to 1,335 feet. This is the third well finished in the Capitan Field up to the present, No. 1 Erburu, the discovery well, being good for 100 bbls. daily and No. 1 Covarrubias of the Shell, 85 bbls. daily.

The new well expected to be finished at Capitan in the immediate future is the Oakburn Oil Co.'s No. 1 on Wagner tideland permit No. 170, which is standing cemented on top of the pay at 1,312 feet. The coring of oil sand in this well has stimulated drilling operations on adjoining tideland permits and as a result preparations are being made to spud in new tideland projects on permits Nos. 173, 176 and 177 held by Frazier and Oliver, R. S. Durkee and Wesley Cunningham. Applications were recently filed with the War Department to construct the necessary piers out into the ocean to facilitate this drilling.

The piers to be projected seaward at Capitan are to be 34 feet wide and will extend out into the open ocean for a distance of approximately 80 feet from mean high tide line. In addition to permits already granted, applications have been filed by W. C. Van Fleet covering tideland permit No. 179, S. J. Dickey on permit No. 180, C. E. Sampson on permit No. 181, A. S. Hayes on permit No. 192, G. L. Ratcliffe on permit No. 183 and E. O. Covarrubias for permit No. 173.

Coyote

The Standard Oil Co. has staked four new locations in the Coyote Field of Los Angeles Basin and it is possible that this quartet, consisting of Nos. 46 and 47 on the Emery lease and Nos. 103 and 104 on the Murphy property, will be spudded in shortly. The Standard recently discovered a new deep productive horizon in this area when No. 43-A Emery came in under a natural flow doing 1,175 bbls. per day from 5,382 feet. The new wells staked this week will be drilled only in order to fulfill lease requirements and not because of any desire to stimulate production. As a matter of fact, the Standard recently assured the general curtailment committee that it would effect an immediate curtailment at Coyote in order to further the attempt to reduce State production to approximately 609,000 bbls. per day.

The Barnsdall is making good footage in its No. 1 Borchard, location on a 60-acre lease in the extreme eastern end of the Huntington Beach Field, but drilling will probably be slowed up somewhat from now on as frequent cores will be taken now that the 5,000-foot level has been reached. The Richfield Oil Co. spudded in No. 1 Heaston, a new well, and is now running two strings of tools in this field. The Smith Petroleum Co. is nearing the 750-foot level in No. 3 Johnson, a new well recently spudded in at Lawndale, and the outcome will be watched with interest because of the failure of this field to register substantial production.

There are six producing wells in this area at the present time showing an aggregate daily production of 820 bbls. These producing wells are No. 2 Howland of the Pacific Western Oil Co., making 150 bbls. daily, No. 1 Brown of the Petroleum Securities doing 50 bbls., Nos. 1 and 2 on the Peck property of the San Clemente Oil Co. producing 75 bbls. and 250 bbls., respectively, and the Smith Development Co.'s Nos. 1 and 8 making 135 bbls. and 160 bbls. daily. The Continental Oil Co. has started rig construction for No. 4 Winann a new well in the Richfield district of Los Angeles Basin, and an early spud is contemplated. Richfield operators met during the past week and agreed to carry out the new curtailment program as far as this field is concerned.

Long Beach

The Petroleum Securities finished a good well in the eastern part of the Long Beach Field during the past week when No. 1 Graham was brought in under a natural flow doing 995 bbls. of clean 28.7 gravity oil daily from 6,728 feet. This new well, which is producing from 198 feet of oil sand, was finished with a 6⅝-inch combination string and 6,643 feet of 2½-inch tubing. No. 1 Painted Hills, located on a 5-acre tract in this area, is being rigged up preparatory to an early spud. Warren & Macrate's No. 2 Mackay, another new well finished at Long Beach during the past week, is flowing 410 bbls. of 29.2 gravity oil per day from 7,445 feet, the 7-inch water string having been landed at 6,483 feet. No. 27 Municipal of the A. T. Jergins Trust showed a sharp contrast with their two new wells as this project was only good for 100 bbls. per day from 8,308 feet. The outcome of this production test was a distinct disappointment as the well had previously painted the derrick and given evidence of resulting in substantial production. In the Inglewood Field the Standard successfully finished well No. 62 on Los Angeles Investment Lease No. 1, pumping 25 bbls. daily from 2,259 feet, the oil testing 16 degrees and showing a cut of three per cent. This project was drilled as a lease requirement and not because of any desire to stimulate field production.

CANADIAN FIELDS

(Continued from Page 77)

just been put into production. Illinois-Alberta Oils' No. 1, LSD 14, Section 12-20-3w5, shut down at 3,683 feet, was also demolished. Further north, Dalhousie Oil Co.'s No. 6, LSD 10, Section 13-20-3w5, also a producer, was wrecked.

In the South Turner Valley, the old Record Oil Co.'s No. 1 derrick in Section 4-19-2w5 was reduced to splinters. This marked the site of what was at one time the deepest well in Canada, and which was ultimately abandoned. In the same area, Mercury Oils' No. 4, a new derrick empty of equipment, was toppled; as was Fairmont's No. 1 in LSD 4, Section 20-19-2w5. In the far south end, Aerolite Oil Corp.'s No. 1, LSD 4, Section 3-19-2w5, also crashed. Vanberta Oils' No. 2, LSD 5, Section 34-18-2w5, recently rebuilt, was damaged. Vanberta's No. 2 was the only actual drilling test affected.

In the central field, Royalite Oil Co.'s No. 23, NW. Section 31-19-2w5, was wrecked when part of a charge being low-

ered for a shot was blown out of the hole by gas pressure. No one was injured, but the outfit was a complete wreck and three automobiles near the well were reduced to scrap. The hole was 5,331 feet down and 511 feet in the lime with a small wet gas production. The crew is cleaning up and preparing to rebuild.

Imperial Operations

In South Turner Valley, Baltac Oils' No. 1, LSD 13, Section 20-19-2w5, has resumed drilling at 5,700 feet after cleaning out and bailing to test production, at about 272 feet in the lime. Location is about a quarter mile west of Home's No. 4 producer and in the same section; but though some wet gas has been met, showings in the deep lime apparently did not correspond to those in the Home producers, where the big gas production was encountered around 172 feet in the lime. Baltac Oils, Ltd., holds 80 acres subject to 12½ per cent royalty to United Oils, Ltd., and development is being handled by Imperial Oil, Ltd., which is to be reimbursed cost plus 10 per cent out of the first production. Hargal Oils' No. 1, same section, at 5,076 feet, offsets the Home producers and is reported logging about 30 feet higher. Lowery Petroleums' No. 1, NW, Section 17-19-2w5, is drilling 263 feet in the lime at 5,370 feet. Sterling Pacific Oil Co.'s No. 1, LSD 15, Section 33-18-2w5, is at 6,440 feet and drilling, being now the deepest drilling test in the field and within 220 feet of the Canadian drilling record. Home Oil Co.'s No. 1, LSD 14, Section 20-19-2w5, is cleaning out with diamond drill at 5,280 feet, after losing most of its normal production of 500 bbls. through bridging.

South Turner Valley

In the South Turner Valley East Crest's No. 2-A, LSD 4, Section 16-19-2w5, has spudded in and is drilling at 175 feet. In Section 20-19-2w5, Calmont Oils' Nos. 11 and 12 are rigging up. Freehold Oil Corp.'s No. 4 is rigging up.

Commonwealth Petroleums' No. 2, LSD 7, Section 9-19-2w5, exploded while building up back pressure to test production from the Dalhousie sand. Three men who had gone into the cellar to adjust the valves were knocked unconscious by the explosion.

Central Turner Valley

In Central Turner Valley, Freeman-Lundy Syndicate's No. 1, LSD 10, Section 1-20-3w5, is drilling 52 feet in the lime at 4,942 feet with a small gas showing. Okalta Oils' No. 1, LSD 1, has come back into production after cleaning out and is making around 250 bbls.

North Turner Valley

In the North Turner Valley, Model Oils' No. 1, LSD 8, Section 22-20-3w5, has resumed drilling in the top of the lime at 5,810 feet. Some good shows of light crude, and about 1,500,000 feet of wet gas, were met in the upper horizons; and the test is expected to get the producing horizon in the lime by the end of March.

Spooner Oils, Ltd., is reported locating its No. 4 test just north of the Vulcan wells, LSD 11, Section 13-30-3w5.

Drilling in the Foothills

Some interesting developments are likely in more than one of the foothills' areas within six weeks. On the Herron structure and the related Moose Dome, north and west of Calgary, two wildcat tests seem to be getting promising indications. On the Moose Dome, Moose Oils' No. 1, LSD 16, Section 29-22-6w5, is reported resuming in the Devonian lime at 2,235 feet after bailing considerable crude. A gas flow, estimated over 2,000,000 feet, was met at this depth. The crude is 43 gravity, and commercial production around 2,500 feet is thought possible. On the Herron structure, Herron Petroleums' No. 1, Section 13-22-6w5, is reported underreaming to carry 13-inch casing to 1,410 feet; this test, which is about 100 feet off the Madison lime, recently got a considerable wet gas flow.

On the Highwood-Sinclair structure, Western Alberta Oil Co.'s No. 1, LSD 11, Section 7-17-2w5, is cemented 46 feet in the Madison lime at 3,178 feet, and was preparing to resume drilling when the 123-foot derrick was toppled over by the recent high wind. No damage was done the machinery, and drilling is expected to resume about March 15. Hudson's Bay Oils' No. 1, LSD 8, Section 1-18-3w5, is standing at 1,240 feet. Warner Oils' No. 3 LSD 3, Section 28-18-3w5, is drilling at 2,170 feet after getting several small gas shows in the Kootenays.

On the Waite Valley structure, Richfield Petroleums' No. 1, Section 35-20-3w5, is at 3,840 feet and drilling after getting shows of oil and gas in the McDougall-Segur sand of the Dakota horizon. Angus Oils' No. 1, LSD 5, Section 3-21-4w5, which appears to be much higher on structure, got the same horizon at 1,705 feet, and is drilling at 1,790 feet.

On the Morley Reserve structure, Wabash Oils' No. 1 is drilling in the Devonian lime at 3,010 feet with intermittent bursts of gas.

On the Pincher Creek structure, Weymarn Petroleums' No. 2, LSD 5, Section 7-6-1w5, is reported drilling at 1,245 feet, after setting 12½-inch casing at 1,220 feet, where small shows of oil and gas were struck.

Red Coulee Field

In the Red Coulee Field west of Coutts, Hannah Porter-Cosmos' No. 1 on the Montana end of the structure, is on top of the Vanalta sand at 2,484 feet with 8-inch casing at 2,480 feet and at last reports was still working to shut off the big water flow. In the Sunburst sand this well made around 10,000,000 feet of gas, later followed for a time by oil, after which water came in and it was decided to carry the test to the Vanalta sand, where Vanalta's No. 1, on the Alberta side of the boundary, got its production. This sand is now considered the upper Ellis. Monalta Oil Co.'s No. 2 should get the Sunburst sand within a few days.

On the Canadian end, Vanalta Oils' No. 2, LSD 3, Section 4-1-16w4, is reported drilling around 2,450 feet. Ko-Top Oils' No. 1, Section 2-1-17w4, is standing at 1,650 feet. Maple Leaf Oil & Refining Co. which is handling Vanalta's No. 1 production in its refinery at Coutts has acquired three 80-acre tracts on the Red Coulee structure and will start development this spring. Homestead Oils, Ltd., which has a test in the lime in South Turner Valley has located its No. 1 Red Coulee in Section 4-1-17w4. Madison Oils, Ltd., has secured acreage in Township 1-17w4 and will drill this spring. Adanac Oil & Gas Co. of Calgary will drill its No. 1 test on the Montana end in E half, Section 8-37-3w. Alberta Pacafic Consolidated's No. 1 has cellar dug, a direct east offset to Vanalta's No. 1 discovery. Askalta Oils, Ltd., of Calgary, has purchased an 80-acre block just south of the Hannah-Porter-Cosmos' No. 1 and will drill a test.

Border Fields

In the Milk River district, Commonwealth Petroleums' No. 1, LSD 9, Section 9-3-15w4, is 115 feet in the Devonian limestone at 3,600 feet depth and held up by mechanical troubles. This is claimed to be the first test in the border area of southern Alberta to drill through the Madison lime into the Devonian. The present objective is the belemnite bed of the Devonians where a break of interesting possibilities is looked for. In Montana the belemnite in the Devonian has been tested in nine wells, disclosing the former presence of oil but no commercial production, but it is thought that these tests were off structure or that the oil found in the higher levels escaped from this horizon. From the failure of Commonwealth's No. 1 to get production in the upper sands, it is argued that an oil deposit may still be retained lower down. In Montana the belemnites were about 600 feet below the top of the Devonian, but in the Milk River area the gradual thinning out of the measures toward the north may bring the horizon within 200 feet.

In the same area, Capitol Oil & Gas Co.'s No. 1-A, LSD 16, Section 32-1-12w4, is reported at 3,090 feet after encountering a considerable show of gas at 3,034 feet. The latter is thought to be either the lower Ellis or the Ellis-Madison contact. The drill has tapped three water horizons, two of which have exhausted themselves. Water is standing 2,000 feet in the hole, but will be swabbed and a test made of the gas production.

Test Duvernay Structure

In central Alberta, Alberta Pacific Consolidated Oils, Ltd., of Calgary, has located its first test on the Duvernay structure east of Edmonton, which it is testing under arrangement with Canadian Exploration Co. of Denver, the original holders of the Duvernay acreage. Location is in LSD 1, Section 4-56-12w4, and the test will spud in before June 1 with cable tools.

In the Kinsella Field, Duluth Syndicate's No. 1 has finished cementing and tests show open flow of 30,000,000 feet with 900 pounds rock pressure. The company will start No. 2 test adjacent to No. 1, utilizing the gas for fuel. No. 2 will be carried down as a deep test for oil, No. 1 having encountered its big gas flow before reaching the potential oil horizon.

Wainwright Field

In the Wainwright Field, Weymarn Petroleums' No. 1 commercial test is reported digging cellar and putting down water well. Daugherty Petroleums' No. 1, LSD 4, Section 28-44-6w4, has derrick up and is moving in equipment. Fabyan Petroleums' No. 3, LSD 16, Section 18-45-7w4, has arranged for rotary equipment which will rig up this month. Wainwell's No. 2, same LSD, which came in a gasser some time ago with a reputed initial open flow of 40,000,000 feet, is reported to show less gas pressure and considerable oil. New derrick will be built and the well cleaned out and oil possibilities tested. Onalta Oils' No. 1, LSD 8, Section 20-45-6w4, has new derrick up, replacing that destroyed by fire and is resuming at 1,925 feet. The heavy gas flow encountered at this depth will be shut off.

Ribstone Developments

In the Ribstone Field, operations have been slowed down owing to weather conditions, but with milder weather resumption is looked for, together with considerable new drilling activity. Meridian Oils' No. 2, LSD 1, Section 16-45-1w4, has been standing cemented on the first sand at 1,776 feet, waiting for storage facilities. Oxville Oil & Gas Co.'s No. 1, LSD 15, Section 10-46-2w4, got the first sand at 1,776 feet, but was drilled deeper and is now standing cemented on top of the second sand at 1,941 feet. It will be drilled into production this month.

Several new tests will likely be started this spring. Monitor Oils, Ltd., of Calgary, has located No. 1 test in Section 20-46-1w4, near Oxville's No. 1. Monitor Oils, Ltd., is headed by W. E. McLeod and E. C. Segur of Calgary. Texecano Oils, Ltd., has secured considerable acreage and will spud in a test next month. Triton Oil Co., financed in Vancouver and California, has secured 1,000 acres south of Lloydminster from Ribstone Oils, Ltd. Location will be made by F. J. S. Sur of Calgary and will be north of Meridian's No. 1 producer and somewhat higher on the structure. The test will probably spud in next month. Meridian's No. 1 discovery well has been producing since last August but has latterly been pinched down owing to storage and transportation difficulties; it made around 100 bbls. a day. The oil is 16.9 Baume crude.

Darlington Oil & Gas Co., recently incorporated under Dominion charter with office at Regina, Sask., has secured 1,280 acres on the Ribstone structure and has located its No. 1 test in Section 34-46-28w3, on the Saskatchewan side but close to the provincial boundary.

A test for water drilled on the Clifford Gilbert farm, 3 miles south of Whitelaw, Alberta, recently encountered a fairly strong gas flow at 80 feet.

British Columbia

In southeastern British Columbia, the Akamina Valley Oil Co. is hauling drilling equipment to its location in Akamina Valley, west of Waterton National Park. George Frederickson is trucking the equipment from Cardston, Alberta, to the park, from which point Morris & Mongeon are hauling it in sleighs over the mountains to the location on Wall Lake.

Tests of the light crude from Crow's Nest-Glacier Oil Co.'s No. 1 well in the Flathead Valley, southwest of Waterton Lake, show it to be a paraffin base product around 72 degrees Baume.

Ontario Fields

In the Thamesville district, Kent County, Ontario, Acme Gas & Oil Co. is reported to have encountered a good show of oil at shallow depth in a test offsetting Basic Resources' No. 2 producer. Acme's No. 3 deep test in the Dover Field, Kent County, offsetting Ajax Oil & Gas Co.'s No. 4 well, is drilling. In Colchester Township, Essex County, Acme's No. 1 deep test is reported drilling around 700 feet.

OKLAHOMA FIELDS

(Continued from Page 97)

Company, farm—	S.T.R.	Wells	Prod.
Gossland	8-8-5	3	35
Gravel	1-8-4	1	8
Hallum	1-8-4	4	549
Smith	8-8-5	1	400
Amerada-Barnsdall:			
Wallace	17-8-5	4	103
Amerada-Hull:			
Green	20-8-5	3	35
Continental-Shell:			
Everett	18-8-5	2	20
Empire:			
Smith	8-8-5	2	212
Gypsy:			
Bourassa	7-8-5	4	45
Gossland	9-8-5	3	386
Miller	18-8-5	8	56
Independent:			
Harding	18-8-5	4	107
I. T. I. O.:			
State Land	16-8-5	1	58
Laurel O. & G.:			
Billington	18-8-5	3	105
Magnolia:			
Billington	8-8-5	3	51
Green	20-8-5	3	51
Magnolia-Gypsy:			
Smith	20-8-5	1	31
McMan:			
Roberts	9-8-5	1	155
Mid-Continent:			
Shelton	18-8-5	3	15
Phillips:			
Hudson	19-8-5	3	85
Wallace	17-8-5	1	15
Pine:			
Lingerfelt	18-8-5	2	122
Smith	8-8-5	2	145
Prairie:			
Campbell	18-8-5	8	76
Jordan	9-8-5	1	21
Prairie et al:			
Villines	20-8-5	1	2
Pure:			
Lindley	18-8-5	8	96
Urbanskey	19-8-5	2	20
Wiley	8-8-5	4	427
Shell:			
Jordan	9-8-5	4	1,115
Sinclair:			
Bellars	19-8-5	10	220
Calvin	7-8-5	3	85
Lewis	6-8-6	2	30
Smith	9-8-5	1	115
Skelly-Lenox:			
Green	20-8-5	1	96
Skelly-Margay:			
Lingerfelt	18-8-5	4	79
Texas:			
Calvin	7-8-5	9	53
Tidal:			
Dunn	12-8-4	1	32
Everetts	18-8-5	2	26
Smith	8-8-5	1	23
Twin State:			
Colvin	7-8-5	2	66
Wilcox O. & G.:			
Smith	8-8-5	8	377
Total		136	5,822

Mission Pool

Amerada:			
Rice	5-8-6	2	228
Carter:			
Fuswa	18-8-6	3	583
Micco	8-8-6	2	90
Carter-Denver P. & R.:			
Melissa	9-8-6	1	364
Continental:			
Maines	7-8-6	4	466
Darby:			
Judy	1-8-5	1	33
Gypsy:			
Baby	6-8-6	1	15
Barkus, N.	6-8-6	10	1,749
Barkus, S.	7-8-6	1	5
Cosar	7-8-6	5	339
Hardy	7-8-6	5	300
Harjoche	7-8-6	3	5
Micco, L.	8-8-6	2	20
Mission	5-6-8-6	7	497
Mosar	1-8-5	4	172
Independent:			
Lawson	1-8-5	5	439
Independent-Kistler:			
Payne	7-8-6	3	914
McMahon:			
Harjo	7-8-6	2	525
Mid-Continent:			
Ripley	23-8-6	1	74
Minnehoma:			
Neal	7-8-6	4	378

Company, farm—	S.T.R.	Wells	Prod.
Pine, W. B.:			
Harjo	6-8-6	3	649
Micco	8-8-6	1	25
Prairie:			
Crain	7-8-6	1	11
Melton	6-8-6	3	450
Micco	5-8-6	1	5
Townsend	6-8-6	2	292
Prairie-Gypsy:			
Owens	18-8-6	2	76
Prairie-Slick			
Nelly	12-8-5	1	92
Shaffer:			
Weaver	12-8-5	3	585
Shell-Continental:			
Hearndon	7-8-6	3	295
Shell-Papoose:			
Maines	7-8-6	8	891
Sinclair:			
Hardy	7-8-6	4	561
Judy	1-8-5	1	20
Tidal:			
Nellie	12-8-5	5	934
Twin State:			
Hayes	8-8-6	2	627
Judy	6-8-6	2	18
Ripley	12-8-5	2	21
Total		110	12,798

Bowlegs Pool

Amerada:			
Rascoe	15-8-6	6	341
Atlantic:			
Baker	10-8-6	4	144
Fleet	23-8-6	3	67
Grayson	13-8-6	3	372
Jones "A"	16-8-6	2	11
Barnsdall:			
McNac	28-8-6	1	18
Morrow	11-8-6	4	164
Carter:			
Bowlegs, I.	15-8-6	4	201
Burden	23-8-6	2	148
Harjoche	14-8-6	6	285
Hilly, D.	23-8-6	3	145
Jones	11-8-6	4	309
Walker	16-8-6	4	230
Wise	23-8-6	11	729
Dixie:			
Lizzy	11-8-6	1	5
Empire:			
Lacey	14-8-6	6	120
Wise	23-8-6	2	63
Gypsy:			
Cumsey	10-8-6	4	343
Grayson	13-8-6	4	393
Harjoche	10-8-6	3	165
Jones	11-8-6	1	12
Walker	15-8-6	7	794
Wise	23-8-6	2	83
I. T. I. O.:			
Barnett "A"	24-8-6	1	18
Barnett "B"	23-8-6	1	5
Billington	22-8-6	3	161
Bowlegs	22-8-6	9	893
Davis	13-8-6	4	38
Fay	13-8-6	9	552
Goforth	15-8-6	12	976
Livingston	15-8-6	10	1,068
Lizzie	11-8-6	3	247
Walker	15-8-6	8	878
Williams	12-8-6	1	140
Wilmot	15-8-6	4	308
Work	24-8-6	1	43
Youngblood	24-8-6	1	9
Magnolia:			
Davis, B. F.	13-8-6	3	114
Davis, M.	13-8-6	1	62
Hammond	10-8-6	8	288
Rhodes	12-8-6	5	283
Vanburskirk	9-8-6	4	213
McCulloch:			
Bowlegs	22-8-6	1	12
Mid-Continent:			
Baker	10-8-6	4	120
Smith	12-8-6	6	352
Minnehoma:			
Bowlegs	13-8-6	1	7
Prairie:			
Gahagan	23-8-6	3	54
Harber	10-8-6	8	721
Jones, G.	11-8-6	3	174
Jones, N.	3-8-6	1	124
Templeton	12-8-6	4	1,162
Whitney	23-8-6	4	204
Pure:			
Reed	14-8-6	14	1,510
Strothers "D"	14-8-6	4	245
Strothers "E"	10-8-6	7	1,086
Shaffer:			
Lacey	14-8-6	3	210
Shell-Houston:			
Taylor	16-8-6	4	Off
Sinclair:			
Cumsey	10-8-6	4	575
Ellen	11-8-6	5	321
Harjo	14-8-6	3	264
Jones	9-8-6	7	105
Taylor, M.	10-8-6	4	495
Taylor, W.	10-8-6	3	412
Walker, I.	22-8-6	4	585
Texas:			
Reed	14-8-6	11	402
Tidal:			
Grayson	13-8-6	4	194
Harjoche	10-8-6	6	491
Total		293	21,269

Earlsboro Pool

Amerada:			
Anderson	15-9-5	1	146
Cowden	4-9-5	7	537
Rogers	3-9-5	2	52
Atlantic:			
Edwards	22-9-5	1	2,448
Barnsdall:			
Brown	10-9-5	3	429
Bruner, F.	2-9-5	2	87
Bruner, N.	10-9-5	2	125
Cudjo	14-9-5	1	9
Davis, D.	11-9-5	3	66
Davis, J.	11-9-5	4	372
Davis, M.	11-9-5	2	11
Gibson	9-9-5	7	351
Hearn	15-9-5	1	1
Ingram, J.	1-9-5	6	122
Pack, S.	10-9-5	3	21
Peter	10-9-5	3	31
Sango	1-9-5	2	399
Sobolka	15-9-5	1	93
Sullivan	15-9-5	1	Off
Sull-Harjo	10-9-5	2	2
Watsutka	12-9-5	3	307
Burke-Greis:			
Wisener	6-9-6	2	119
Burke-Greis-Red Bank:			
Mayes	1-9-5	3	1,163
Carter:			
Cox	31-10-6	1	76
Davis, S.	13-9-5	3	35
Gilliam	13-9-5	2	676
James	6-9-6	3	789
Shepherd	6-9-6	2	198
Commerce Dev. Co.:			
Bld. 4	8-9-5	1	21
Continental:			
Kays	2-9-5	2	55
Spencer	12-9-5	4	521
Cosden:			
Anderson	13-9-5	2	400
Sarber	13-9-5	1	30
Empire:			
Barker	12-9-5	1	19
Edmundson	3-9-5	2	72
Empire-Amerada:			
Bullock, W.	8-9-5	3	987
Henry	8-9-5	1	731
Empire-Continental:			
Anderson	13-9-5	2	53
Empire-Gypsy:			
Keys	6-9-5	1	22
Gypsy:			
Bruner	10-9-5	4	689
Carter, B.	11-9-5	7	938
Earl	16-9-5	1	11
Hunick	5-9-5	2	937
Noble	12-9-5	3	370
Peter	10-9-5	1	52
Sango	1-9-5	10	1,016
State	16-9-5	2	122
Wisener	1-9-5	1	22
Eason Oil Co.:			
B.S.&B.	8-9-5	1	507
White	8-9-5	1	873
Eason Oil Co.-C. E. Knox:			
Langford	8-9-5	1	1,179
E. Haer:			
Haer	31-10-5	1	20
Hubbell-Graham:			
Dobbs	8-9-5	1	23
Independent:			
Bruner	10-9-5	3	86
Sullivan	10-9-5	1	8
Independent-Darby:			
Knapp	8-9-5	2	252
Independent-Margay:			
Gaines	11-9-5	3	41
Magnolia:			
Bryant	9-9-5	2	15
Cowden	4-9-5	1	Off
Dixon	12-9-5	1	11
Edmundson	3-9-5	1	4
Germany, M.	30-9-5	1	6
Gillian	13-9-5	3	1,090
Grounds	23-9-5	1	100
Homsley	11-9-5	3	7
Hyde	13-9-5	2	56
Ingram	10-9-5	1	4
Lena	10-9-5	3	21
Seay	12-9-5	9	153
Simpson	10-9-5	4	181
Sparks	11-9-5	6	63
Sullivan	12-9-5	2	208
Mid-Continent:			
McKinley	9-9-5	3	13
Rogers	5-9-5	5	556
Mid-Kansas:			
Anderson	14-9-5	1	25
Phillips:			
Dunaway	14-9-5	1	17
Reade	8-9-5	2	746
Prairie:			
Davis	13-9-5	3	365
Graham, C.	3-9-5	1	Off
Graham, O.	10-9-5	4	266
Stidham	11-9-5	9	215
Prairie-Skelly:			
Campbell	6-9-6	7	1,446
Prairie-Whitney:			
Harjo	24-9-5	1	Off
Shaffer:			
Clark	1-9-5	2	123
Shell:			
Bayless	17-9-5	1	9
Hearn	13-9-5	1	10
Spencer	12-9-5	2	373
Sinclair:			
Alexander	36-10-5	1	140
Foreman	18-9-5	1	10
Sango	2-9-5	4	273
Sinclair et al:			
Foreman	18-9-5	1	100
Skelly:			
Mayes	1-9-5	4	233
Sheppard	6-9-6	4	1,364
Spencer	12-9-5	1	313
Skelly-Atlantic:			
Cherry	6-9-6	4	289
Lottie	6-9-6	3	135
Skelly-Prairie:			
Varnum	5-9-6	2	547
Superior:			
Ingram	1-9-5	2	955
Songster	8-9-5	3	1,155
Walker	2-9-5	2	791
Superior-Shaffer:			
McKay	36-10-5	1	159
Texas:			
Anderson	2-9-5	8	61
Brown	10-9-5	8	56
James	6-9-6	2	89
Rogers	5-9-5	5	23
Wilmot	10-9-5	6	45
Tidal:			
Walker	35-10-5	2	604
Watkins	9-9-5	7	1,066
Twin State:			
Anderson	22-9-5	1	4
Barker	12-9-5	2	28
Hearn	2-9-5	2	38
Magruder	7-9-5	2	231
Total		299	33,524

East Earlsboro Pool

Company, farm—	S.T.R.	Wells	Prod.
Amerada-Dixie:			
Fullerton	19-9-6	4	2,270
Scott	19-9-6	1	414
Sullivan	17-9-6	4	1,340
Barnsdall:			
Gilliam	13-9-5	1	28
Noble	18-9-6	5	584
Burke-Greis-Red Bank:			
Fixico	17-9-6	3	936
Carter:			
Campbell	20-9-6	2	2,309
Chowning	19-9-6	2	450
Harber	7-9-6	3	1,760
Wrightsman	19-9-6	4	2,199
Continental:			
McGuire	24-9-5	1	235
Gypsy:			
Maley	20-9-6	4	589
Noble, B.	18-9-6	4	1,373
Taylor	19-9-6	1	45
Gypsy-Devonian:			
Payne	18-9-6	12	3,041
Independent-Atlantic:			
Fixico, L.	20-9-6	3	1,277
Magnolia:			
Anderson, A.	18-9-6	12	2,516
Anderson, D. W.	18-9-6	4	908
Anderson, Panos	18-9-6	3	529
Moore	24-9-5	3	744
Mid-Continent:			
McDaniels	7-9-6	1	48
Minnehoma:			
Noe	17-9-6	5	1,121
McMan:			
Jones	20-9-6	1	734
Prairie:			
Baker	24-9-5	5	306
Calkins	17-9-6	3	649
Raitman	18-9-6	3	847
Wisner	18-9-6	1	10
Prairie-Slick:			
Wilson	8-9-6	1	148
Producers & Refiners:			
Jefferson	19-9-6	4	1,300
Shell:			
Hopper	19-9-6	8	11,279
Sinclair:			
Miller	24-9-5	1	278
Nichols	19-9-6	8	3,367
Texas:			
Magruder	19-9-6	6	837
Tidal:			
Lasley	19-9-6	2	1,129
Tidal et al:			
Harjo	20-9-6	1	156
Total		126	45,756

Seminole Pool

Company, farm—	S.T.R.	Wells	Prod.
Amerada:			
Fixico	23-9-6	2	52
Killings	25-9-6	4	212
Rentie	23-9-6	3	252
Atlantic:			
Cudjo	35-9-6	3	252
Barnsdall:			
Carter	24-9-6	6	131
Henry	14-9-6	2	302
Jones	34-9-6	4	263
Carter:			
Carter, B.	24-9-6	2	24
Carter, F.	23-9-6	3	51
Creamer	34-9-6	1	2
Cudjo, R.	35-9-6	4	74
Cudjo, W.	34-9-6	1	47
Gilliland	27-9-6	1	53
Grisso	23-9-6	4	66
Grisso, M.	15-9-6	1	99
Killing, G. F.	14-9-6	4	26
Killing, M. E.	23-9-6	12	2,071
Knapp	13-9-6	1	30
Lukes	27-9-6	5	490
Pounder	34-9-6	2	102
Simpson	35-9-6	2	79
Strothers	34-9-6	4	273
Vierson	23-9-6	1	13
Carter et al:			
Sanford, C.	16-9-6	1	103
Wisner, C.	16-9-6	1	59
Darby:			
Carter, J.	24-9-6	4	36
Fixico	26-9-6	7	1,018
Harjo, D.	25-9-6	1	32
Harjo, T.	23-9-6	3	38
Empire:			
Gross	25-9-6	1	31
Wilson	34-9-6	2	113
Gypsy:			
Butler	35-9-6	4	156
Carter	24-9-6	8	461
Cudjo, T.	34-9-6	4	627
Fixico	26-9-6	7	68
Harjo	25-9-6	3	61
Wolfe	26-9-6	4	375
Independent:			
Butler	35-9-6	3	243
Fixico, P.	23-9-6	3	376
Harjo	25-9-6	2	17
Independent-Garland:			
Fixico, T.	26-9-6	5	124
Independent-Inter-Ocean:			
Jones	26-9-6	4	346
I. T. I. O.:			
Allen	25-9-6	2	29
Bowlegs	26-9-6	12	1,378
Goodin	23-9-6	3	139
Harjo	23-9-6	3	31
James	24-9-6	2	21
Reed	24-9-6	1	1
Kingwood-Shell:			
Harjo	22-9-6	3	266
Magnolia:			
Franks	25-9-6	3	101
Mid-Continent:			
Rentie	14-9-6	9	307
Tayeche	24-9-6	5	98
Phillips:			
Strothers	27-9-6	2	82
Prairie:			
Cudjo, R.	35-9-6	3	173
Franks	35-9-6	6	506
Giblet	35-9-6	3	797
Gross	25-9-6	5	17
Mason	36-9-6	1	25
Spencer	13-9-6	1	6
Strothers	27-9-6	8	733
Tiger	1-8-6	1	18
Pure:			
Strothers	26-9-6	17	2,957
Strothers "B"	36-9-6	4	180
Strothers "C"	34-9-6	1	226
Shell:			
Harber	22-9-6	1	57
Lasley	22-9-6	2	4
Sinclair:			
Carter, J.	13-9-6	2	15
Cudjo "A"	35-9-6	6	387
Cudjo "B"	35-9-6	4	433
Dixey	22-9-6	2	263
Fixico	23-9-6	4	293
Superior:			
Cudjo, B.	35-9-6	4	59
Noble	15-9-6	1	1
Texas:			
Mayhue	14-9-6	2	386
Strothers	2-8-6	1	25
Turman:			
Cudjo	35-9-6	4	742
Grisso	35-9-6	1	269
Jones	34-9-6	4	704
Total		272	21,037

East Seminole Pool

Barnsdall:			
Keypaya	7-9-7	1	9
Blackwell:			
Jonah	15-9-7	1	117
Continental:			
Boring	17-9-7	1	40
Johnson	18-9-7	3	425
Continental-Sinclair:			
Perry	18-9-7	3	551
Devonian:			
Harjo	18-9-7	1	9
Gypsy:			
Harjo	18-9-7	2	274
Magnolia:			
Drewery	18-9-7	2	23
Prairie:			
Stubbs	18-9-7	3	357
Shaffer:			
Hangler	19-9-7	1	Off
Sinclair:			
Coody, B.	18-9-7	3	326
Coody, D.	17-9-7	1	37
Johnson, G.	18-9-7	1	83
Johnson "B"	18-9-7	1	60
Thompson "B"	18-9-7	2	737
Sinclair-Continental:			
Warrior, J.	17-9-7	2	30
Sinclair-Gypsy:			
Okfuskee	18-9-7	1	120
Sinclair-Phillips:			
Warrior, S.	17-9-7	2	60
Total		31	3,248

Searight Pool

Amerada:			
Johnson	4- 9 6	1	15
Nicey	3- 9-6	1	2
Strothers	3- 9-6	2	81
Barnsdall:			
Jackson	5- 9-6	2	13
Johnson	22-10-6	1	Off
Burke-Greis et al:			
Nevins	32-10-6	2	707
Varnum	32-10-6	1	203
Carter:			
Davis	4- 9-6	2	96
Frazier	3- 9-6	3	22
Kiker	2- 9-6	1	13
Mandler	3- 9-6	2	6
Scott	26-10-6	1	10
Amerada (Comm.)	11- 9-6	1	10
I.T.I.O. (Comm.)	11- 9-6	1	184
Mayhue (Comm.)	11- 9-6	3	1,374
McMan (Comm.)	11- 9-6	1	163
Skiff (Comm.)	10- 9-6	1	22
Slick (Comm.)	11- 9-6	3	460
Stewart (Comm.)	10- 9-6	1	126
Strothers (Comm.)	11- 9-6	3	883
Gypsy:			
Cudjo, M.	4- 9-6	3	454
Nevins	32-10-6	2	367
Saloche	31-10-6	1	44
Magnolia:			
Varnum	32-10-6	3	321
Varnum, W. F.	5- 9-6	1	39
Mid-Continent:			
Grayson	34-10-6	4	23
Saloche	33-10-6	5	245
Mid-Continent-Homaokla:			
Nevins	32-10-6	4	420
Papoose:			
Marks	32-10-6	1	150
Pine, W. B.:			
Lulu	4- 9-6	1	43
Prairie:			
Cannon	33-10-6	1	1
Carter, J.	10- 9-6	1	1
Hauck	33-10-6	1	4
Hurford	32-10-6	1	13
Kinkaid	33-10-6	2	30
Weimer	22-10-6	1	46
Pure:			
Aldridge	3- 9-6	3	531
Shell:			
Crump	32-10-6	1	28
Strothers	3- 9-6	3	109
Sinclair:			
Nevins	5- 9-6	1	266
Polly	3- 9-6	4	939
Superior:			
Varnum	4- 9-6	1	15
Texas:			
Fleet	4- 9-6	1	15
Twin State:			
Varnum	4- 9-6	2	81
Wilcox:			
Chupco	4- 9-6	6	161
Total		87	9,269

Daily average production of St. Louis Pool for the week ending February 24:

St. Louis Pool

Company, farm—	S.T.R.	Wells	Prod.
Amerada:			
Richardson	16-7-4	2	59
Atlantic et al:			
Bass	9-7-4	1	38
Bourassa (Stand)	10-7-4	1	75
Burke	16-7-4	3	283

Company, farm—	S.T.R.	Wells	Prod.
Milburn	15-7-4	1	75
McGee	4-7-4	1	333
Barnsdall:			
Stahl	30-7-5	3	428
Blackwell:			
Cherry	25-7-4	3	294
Lewis	24-7-4	2	94
British-American:			
Coley	24-7-4	2	83
McGee	23-7-4	5	137
Continen.al et al:			
Brandenburg	34-8-4	1	315
Darby:			
Bettis	21-7-4	1	76
Harber	23-7-4	1	23
Nixon	9-7-4	2	138
Youngblood	16-7-4	4	231
Darby-Atlantic:			
Cardwell	15-7-4	1	203
Empire:			
Bettis	17-7-4	1	50
Jackson	36-8-4	1	175
State	36-7-4	1	68
Gypsy:			
Bruno	25-7-4	3	47
Collins	25-7-4	4	432
Dodson	26-7-4	4	66
Duvall	3-7-4	1	518
Green	17-7-4	6	2,658
Johnson	29-7-5	1	55
LeClair	23-7-4	4	751
Rosemond	26-7-4	4	274
Stahl	30-7-5	4	75
Swartz	2-7-4	1	Off
Gypsy et al:			
Johnson, W.	7-7-4	1	60
Healdton:			
Hines	17-7-4	1	43
Home Gas Co.:			
St. Louis	14-7-4	1	228
Houston Oil:			
Wyatt	17-7-4	5	498
Independent:			
Barrow	1-7-4	3	388
Blandin	30-7-5	5	957
Youts	19-7-5	8	1,175
Independent-Darby:			
Brown	14-7-4	2	6
Davis	15-7-4	2	36
Freid	23-7-4	2	49
Jordon	10-7-4	1	20
LeClair	23-7-4	1	59
Pappan	16-7-4	3	299
Pillar	15-7-4	1	5
Sandridge	14-7-4	3	15
Wallace	14-7-4	4	73
Independent et al:			
Hamby	14-7-4	2	16
Larsh	2-7-4	1	10
Wax	30-7-5	1	25
Independent-Mid-Kansas:			
Asher	3-7-4	1	Off
Weldfelt	2-7-4	3	582
Independent-Range:			
Null	35-8-4	2	163
Independent-Skelly:			
James	17-7-4	2	109
Independent-Westland:			
Booze	9-7-4	1	27
Rhodd	16-7-4	3	234
I. T. I. O.:			
Brandenburg	35-8-4	2	1,865
McGee	26-7-4	1	113
Shobe	35-8-4	4	143
Weams	21-7-5	1	85
Weldfelt	2-7-4	3	420
I. T. I. O.-Sinclair:			
Woodard	18-7-5	1	27
Keister-Manning:			
Kelly	2-7-4	3	385
Magnolia:			
Anderson	1-7-4	1	Off
Banta	14-7-4	3	239
Billington, C.	11-7-4	1	3
Billington, E.	22-7-4	1	467
Brandenburg	18-7-5	5	926
Bullock	18-7-5	1	1
Caudle	13-7-4	2	55
Cherry "A"	26-7-4	5	191
Cherry "B"	26-7-4	3	22
Cherry, J. H.	13-7-4	1	26
Clour	11-7-4	2	11
Davis, C. E.	24-7-4	1	7
Davis, Frank	15-7-4	2	8
Engle	34-7-4	1	40
Fyke, George "A"	20-7-5	1	45
Fyke, George "B"	20-7-5	2	233
Fyke, L. L.	20-7-5	1	4
Fyke, Tulie "A"	20-7-5	1	63
Fyke, Tulie "B"	20-7-5	2	285
Fyke, Tulie "C"	20-7-5	1	18
Fyke, Tulie "D"	20-7-5	2	142
Fyke, Tulie "E"	28-7-5	1	10
Green, B. M.	13-7-4	1	5
Green, Lulla	13-7-4	1	43
Quinn	20-7-5	1	21
Harden	12-7-4	2	125
Hatcock, C. D.	11-7-4	1	7
Hatcock, Lee	11-7-4	1	60
Harper, J. J.	19-7-5	1	8
Harper, James	19-7-5	2	5
Hembree	19-7-5	4	47
Hilton, J. E.	22-7-4	2	1,036
Hilton, Maud	22-7-4	1	118
Jones "A"	18-7-4	1	68
James, M.	8-7-4	2	11
Jordan	12-7-4	1	31
Kiner	17-7-5	1	2
Latimer	17-7-4	2	66
Louis, J. L.	15-7-4	1	5
Lynn, D.	21-7-4	1	459
Lynn, F.	21-7-4	2	126
Mull	15-7-4	2	2
Nicklass	31-7-5	2	70
Nona	11-7-4	1	28
Ogle	22-7-4	1	23
Richardson	15-7-4	2	124
Risenhoover	14-7-4	4	11
Robbins, J. M.	15-7-4	4	163
Robbins, Pearl	15-7-4	1	36
Rowe, I.	18-7-5	1	16
Rowe, M.	18-7-5	1	4
Shipshewano	19-7-5	4	70
Singletary, D.	13-7-4	1	1
Singletary, F.	23-7-4	3	8
Singletary, T.	14-7-4	3	21
Tartar	15-7-4	2	841
Vieux, F.	13-7-4	1	7
Vieux, N.	13-7-4	1	1
White, Roy	20-7-5	1	6
Wilborn, Mary	24-7-4	2	269
Wilborn, S. A.	24-7-4	6	430
Willamette	11-7-4	1	22
Wyatt	4-7-4	2	164
Youts, Charles	20-7-5	5	150
Youts, C. A.	19-7-5	4	288
Youts, H. E.	20-7-5	7	544
Magnolia-Pierce:			
Hubanks	17-7-4	2	505
McCulloch et al:			
Bruno	25-7-4	5	736
Smith	25-7-4	6	713
Mid-Continent:			
Decker	8-7-4	1	45
Guinn	20-7-5	1	20
Robbins	9-7-4	2	20
Mid-Kansas:			
Getzelman	25-7-4	4	512
Lunay	30-7-5	3	214
Minnehoma:			
Simms	16-7-4	3	81
Packard:			
Church	29-7-5	1	225
Panther:			
Town Lot	14-7-4	1	47
Town Lot	23-7-4	1	Off
Phillips:			
Cherry	25-7-4	2	75
Grace	2-7-4	1	35
Lydick	24-7-4	1	15
Stahl	30-7-5	4	165
Prairie:			
Bodkins	26-8-4	1	35
Deatherage	28-7-4	1	30
Desmond	25-7-4	4	17
Ellison	25-7-4	4	161
Gammon	30-7-5	8	2,618
Hembree, A. O.	19-7-5	4	758
Hembree	18-7-5	1	11
Linn	30-7-5	4	198
Meyer	32-7-4	1	41
McGee	4-7-4	1	285
Smith	30-7-5	3	25
Wolf	29-7-5	4	360
Youns	19-7-5	4	108
Prairie et al:			
Davis	18-7-5	4	20
Nesbit	18-7-5	2	168
Pugh	7-7-5	1	13
Prairie-Shaffer-Independent:			
Cummings	17-7-4	2	166
Reagan	17-7-4	3	816
Rice	17-7-4	2	61
Pure:			
Brandenburg	21-7-4	1	232
Dodson	26-7-4	2	72
Duval	4-7-4	1	30
Pure et al:			
Latimer	21-7-4	1	88
Thomas	26-7-4	4	526
Thrilkill	19-7-5	1	47
Tolen	1-7-4	1	65
Shaffer O. & R.:			
Cherry	25-7-4	4	134
Tolen	30-7-5	4	299
Shell:			
Hines	22-7-4	1	88
Smith	21-7-5	1	112
Stahl	30-7-5	1	Off
Younts	28-7-5	1	40
Sinclair:			
Blandin	24-7-4	13	1,585
Brandenburg	7-7-5	3	370
Bruno	26-7-4	2	63
Coley	24-7-4	2	255
Gilbreath	25-7-4	2	605
M-Qua-Ka	11-7-4	1	50
Nadash	29-7-5	4	465
Nealey	25-7-4	5	405
Nealey "B"	25-7-4	2	525
Nesbit	18-7-5	8	1,095
O-Kitchee	19-7-5	7	400
Sinclair et al:			
Kelly "A"	2-7-4	2	135
Skelly:			
Decker	16-7-4	3	734
Slick-White Eagle:			
Latimer	16-7-4	3	328
Superior:			
Caudle	13-7-4	2	21
Jackson	36-8-4	1	35
Texas:			
Cherry	25-7-4	4	305
Goodin	25-8-4	1	1
Zoeller	30-7-5	1	9
Twin State:			
Nona	4-7-4	1	80
Warner-Quinlan:			
Light	16-7-4	1	42
Westheimer-Daube:			
Freid	24-7-4	5	296
Garrett	23-7-4	2	46
Wes.heimer-Daube-Gypsy:			
McGee	23-7-4	5	55
Wyatt:			
Fee	10-7-4	1	18
Smith	26-7-4	1	30
Total		470	43,619

Asher Pool

Commercial Development Co.:			
Townsite	19-6-4	1	5
Independent:			
Gardiner	19-6-4	1	113
Obermeyer:			
Townsite	19-6-4	1	Off
Prairie-Slick:			
Carpenter	19-6-4	1	481
Laster	19-6-4	8	471
Simms:			
Laster	19-6-4	5	723
Slick:			
Alexander	19-6-4	3	167
Bledsoe	20-6-4	1	52
Weldon	20-6-4	2	61
Slick-Amerada:			
Walker	19-6-4	2	45
Texola:			
Townsite	19-6-4	1	Off
Total		26	2,078

Sasakwa Pool

Blackwell:			
Vanburskirk	7-6-8	1	190
Carter:			
Aldridge	7-6-8	1	15
Brannon	18-6-8	1	Off
Davis	7-6-8	1	20
Fleet	13-6-7	1	Off
Phillips	18-6-8	1	20
Spillman	7-6-8	2	599
Gypsy:			
Phillips	18-6-8	1	48
I. T. I. O.:			
Fleet	13-6-7	1	160
Holatka	7-6-8	2	91
Magnolia:			
Diamond	8-6-8	1	15
Spillman	12-6-7	1	135
Prairie:			
Diament	12-6-7	1	24
Patton	18-6-8	2	70
Pure:			
Bates	13-6-7	8	4,934
Shell:			
Holatka	7-6-8	2	103
Signal:			
Bond	13-6-7	4	780
Sinclair:			
Davis "A"	17-6-8	7	1,892
Davis "B"	7-6-8	2	Off
Tiger	6-6-8	1	45
Skelly:			
Chapman	8-6-8	1	40
Texas:			
Bruner	9-6-8	1	8
Bryan	9-6-8	1	36
Twin State:			
Marshall	7-6-8	1	27
Total		45	9,243

Konawa Pool

Champlin-Shell:			
Sachemeche	9-6-6	2	1,345
Empire:			
Sachemeche	9-6-6	2	317
E. L. Harris et al:			
Harjoche	8-6-6	3	2,342
Gypsy:			
Barhan	8-6-6	1	301
Independent:			
Okfuska	16-7-4	1	7
Oyster	8-6-6	1	137
McCulloch et al:			
Cully	16-6-6	1	531
Snyder	8-6-6	1	15
Prairie:			
Griffin	17-6-6	1	596
Total		13	5,591

Allen Pool

Barbara:			
Mount	36-5-7	1	10
Barnsdall:			
Lusty	15-5-7	2	502
Blackwell:			
Fleet	13-5-7	3	984
Burke-Greis:			
Nitchee	18-5-8	5	746
Dixie:			
Payton	1-4-7	3	140
Gilcrease:			
Punka	17-5-8	2	400
Reed	18-5-8	2	21
Reed, W.	18-5-8	1	50
Gypsy:			
Peter	18-5-8	9	217
Peter	23-5-7	3	2,482
Homaokla:			
Adams	19-5-8	7	312
McCall, M.	17-5-8	11	50
Milner et al	17-5-8	4	28
Milner, J. B.	16-5-8	2	12
Ritchie	1-4-7	5	128
Wheeler	16-5-8	1	2
I. T. I. O.:			
Bingham	8-5-8	3	148
Mathis	13-5-8	2	146
Osborn	18-5-8	3	80
Loual-Carter:			
Bates	36-5-7	1	10
Louisiana O. & R.:			
Harjo	17-5-8	6	155
McElroy	17-5-8	5	144
Perry	20-5-8	13	658
Pumiuste	8-5-8	4	272
Reed	18-5-8	4	412
Reed "A"	18-5-8	1	15
Statler	7-5-8	2	95
Warfle	20-5-8	3	105
Magnolia:			
Reed	17-5-8	8	478
Reed "A"	13-5-7	3	357
Parney	14-5-7	2	348
Mid-Continent:			
Fleet	7-5-8	15	1,405
Harjo	14-5-7	3	614
Pine, W. B.:			
Davis	17-5-8	1	60
Prairie:			
Harris	8-5-8	1	10
Simena	11-5-7	1	15
Wyecka	24-5-7	1	20
Ramsey:			
Butler	17-5-8	1	5
Butler, M.	20-5-8	1	12
Kerr	1-4-7	1	37
McElroy	17-5-8	1	32
Milner	17-5-8	9	850
Parker	17-5-8	2	32
Harjo	20-5-8	2	15
Smith	8-5-8	1	10
Warfle	20-5-8	1	5
Webb	20-5-8	5	80
Whitney	19-5-8	5	575
Shaffer, C. B.:			
Chapman	36-5-7	1	20
Yoakum	16-5-8	6	230
Sinclair:			
Amos "B"	7-5-8	1	150
Cully	13-5-7	2	60
Jefferson	23-5-7	5	685
Narchoche "A"	18-5-8	1	10
Narchoche "B"	18-5-8	5	100
Peter	18-5-8	2	75
Joanna "B"	24-5-7	1	167
Skelly:			
Osbourne	23-5-7	1	22
Sunray:			
Amos	7-5-8	1	55
Cully "A"	18-5-8	8	301
Cully "B"	18-5-8	8	517
Joanna	24-5-7	1	13
Nitchey	18-5-8	4	385
Nitchey, So.	19-5-8	3	400
Sarney	19-5-8	2	91
Texas:			
Hyde	8-5-8	5	304
Lewis	13-5-7	2	302
Lucy	18-5-8	11	1,070
Jefferson	23-5-7	1	Off
Westheimer:			
Milliner	8-5-8	3	102
Westheimer et al:			
Wade	19-5-8	9	572
Westheimer-Daube:			
W. A. Patterson	29-5-8	1	36
Total		256	19,030

Oklahoma City Pool

Coline:			
Clour	25-11-3w	1	Off
Olds	24-11-3	4	7,373
Warren	18-11-2	3	6,382
Cromwell-Franklin:			
Trosper Park	13-11-3	5	475
I. T. I. O.:			
Bodine-Anderson	30-11-2	1	Off
Bodine, A.	24-11-3	4	452
Bodine, S.	30-11-2	2	314
Brokaw, A.	13-11-3	1	Off
Brokaw, C.	13-11-3	1	1,002
Button	19-11-2	4	4,021
Canfield, L.	19-11-2	1	1,400
Canfield, Butt.	19-11-2	1	Off
Drake	14-11-3	2	Off
Emmerson, N.	30-11-2	2	883
Emmerson, Joyce	25-11-3	1	Off
Farley	19-11-2	1	Off
Fortson, E.	24-11-3	2	1,486
Fortson-Farley	24-11-3	2	13,803
Foster	24-11-3	1	80
Fuzzell, Farley	19-11-2	1	4,285
Fuzzell	19-11-2	1	Off
Henning, K.	24-11-3	1	3
Hiddleston, S.	19-11-2	1	542
Jennings	13-11-3	3	1,033
Johnson	25-11-3	3	109
Jones	31-11-2	1	891
Mackey	26-11-3	1	48
Oklahoma City	24-11-3	1	36
Peterson, Sadie	25-11-3	1	563
Speegle et al	24-11-3	1	188
Thomas Fuzzell	13-11-3	1	1,033
Trosper	13-11-3	8	6,649
Trosper, L.	12-11-3	1	588
Verne	13-11-3	2	2,594
Waters	25-11-3	3	2,112
Wheeler	13-11-3	2	1,116
Williamson, Can.	24-11-3	1	137
Wilkie-Ander	25-11-3	1	Off
Mid-Kansas:			
Browning	18-11-2	1	Off
Fortson	24-11-3	5	1,595
Mollman	23-11-3	1	428
Trosper	19-12-1	1	242
Prairie-Slick:			
Hiddleston	19-11-2	7	7,193
Shaffer, J. C.:			
Childs	14-11-3	1	Off
Shell:			
Petty	30-11-2	6	244
Sinclair:			
S. Land No. 54	36-11-3	1	Off
Stamper	30-11-2	6	563
Sinclair-Amerada:			
Kinter	30-11-2	2	578
Slick, T. B.:			
Glidden	13-11-3	2	2,532
Zerkerle	13-11-3	1	1,161
Skelly:			
Hoops	31-11-2	1	5,042
Wirt Franklin:			
Lowery	12-11-3	3	9,159
Total		111	86,572

ROCKY MOUNTAIN AREA

(Continued from Page 77)

Steinmier, SW SW, Section 35-18-70, Canon City district, is drilling at 2,190 feet.

Larimer County

The Continental Oil Co.'s No. 5 Scott, NE NW, Section 6-9n-68, Wellington Dome, is drilling at 2,400 feet.

Adams County

Nettie M. Slatt's No. 1 Hills, SE cor., Section 27-3s-64, Watkins area, is drilling at 1,045 feet and carrying the 12½ inch.

Jackson County

Charles R. Allen and C. A. Johnson, drilling contractors, are shipping two carloads of equipment from the Continental Oil Co. operation near Walden to Calgary, Canada, where they have a drilling contract for that company. All the Continental producing and drilling wells in the Walden district are shut down under an agreement with the Government made when the permits were extended. It is understood the agreement provides that one well may be drilled on the South McCallum Dome in 1930. The Continental drilled a test on that structure and encountered the pay where it found a flow of carbon dioxide gas and oil similar to the discovery on the North McCallum Dome, but difficulties of many kinds prevented the completion of the test. Last summer its No. 2 Hoye, SE NE, Section 34-9s-78, was started under a drilling contract, but has been

honey Dome produces gas in the Dakotas and Sundance, but has never been tested below the last named horizon. No. 2 was started to explore the lower formations. It apparently passed out of the red beds at 4,319 feet, where the 8¼-inch was cemented and a change over from rotary to cable tools was made. At that time it was reported to have a show of oil, supposedly in the top of the Embar. The 6¼-inch has been cemented at 4,585 feet and the hole is drilling in sand at 4,619 feet. This probably is the Tensleep. Few tests have been drilled to the Pennsylvanian in southern Wyoming, but one put down on the Ferris Dome by the Producers & Refiners two years ago showed considerable light oil in what was believed to be the Tensleep.

Sweetwater County

The Mountain Fuel Supply Co. wells in this district are all shut down except its No. 1 Sullivan, SW SW, Section 10-16-104, South Baxter Basin, drilling at 3,430 feet, and its No. 1 Union Pacific, Section 11-17-104, drilling at 2,563 feet.

Uinta County

The California Co.'s No. 1 Union Pacific, NE NW, Section 7-17-116, Muddy Creek, is drilling at 4,630 feet.

Big Horn County

The Ohio Oil Co.'s No. 1 Union Gas, 9-2s-96, Piceance Creek, has resumed after being idle for some time on account of the cold weather. The hole is bottomed at 3,010 feet and underreaming to lower the 8¼-inch is in progress. While this test has had several important shows of gas, the largest being at 2,810 feet where the gas became ignited and burned the rig, it has not yet cut a true oil sand. The big sand which shows saturation at the outcrop has not yet been reached. The gas has continued all the way down and at the present bottom of the hole there is a show of green oil. The Texas Production Co.'s No. 1 Potter, NE SW, Section 30-2n-96, White River, is coring at 5,848 feet, supposedly in the Lewis shale.

WYOMING

Fremont County

The Texas Production Co.'s No. 1 State, SW SW, Section 36-34-95, Alkali Butte, is drilling at 2,860 feet. The first Frontier at 2,606-14 feet had a show for 1,000,000 feet of gas a day, but the second Frontier at 2,750 feet had water. The Kinney-Coastal Oil Co.'s No. 1 Dykeman, SW SW, Section 22-3n-1w, Pilot Butte, is coring in black shale at 3,440 feet and carrying the 8¼-inch.

Carbon County

The Producers & Refiners Corp.'s No. 2, SE NW, Section 34-26-88, Mahoney Dome, is developing into a mystery well, since the company has given out no information as to results though it has reached an interesting depth. The Mashut down at 1,025 feet. It is understood this is the well which will be drilled to completion.

Yuma County

The Phillips Petroleum Co.'s No. 1 Andrews, NW NW, Section 3-2s-42, just west of the Kansas line, is drilling below 4,910 feet.

Moffat County

The Texas Production Co.'s No. 1 Berlin, SW NE, Section 19-12n-100, Bartram Dome, has resumed, but has not yet made any new hole below 2,347 feet, at which depth it had an aggregate flow of 72,000,000 feet of gas from four horizons. The Mountain Fuel Supply Co.'s No. 1 Lasher, NE NE, Section 25-12n-101, 1 mile southwest of the Texas well, is drilling at 1,725 feet and about at the depth in which the first gas horizon was encountered in the discovery well. The Midwest Refining Co.'s No. 24 Hannewalt, SE SE, Section 4-6n-92, Bell Rock, is drilling at 1,460 feet in sandy shale. It had some water in the hole at 1,000 feet. The 16-inch was cemented at 810 feet. The same company's No. 19-SD Parkinson, SW NE, Section 22-4n-92, Iles Dome, is drilling in the Frontier at 2,555 feet. The Frontier was topped at 2,522 feet and there was a show of live oil at 2,527-29 feet.

Rio Blanco County

The White Eagle Oil & Refining Co.'s No. 1-A Fordham, NW SW, Section Blackfoot Indian Reservation. The Texas Company is the latest firm to secure leases and has a total of 1,853 acres that it bid in at a sale recently held. The Texas Company bid 15 cents per acre over the regular $1 per acre rental charge.

The Standard Oil Co. of Indiana has filed copies of its incorporation papers with the Montana state officials and has declared its intention to enter Montana on a business basis this spring.

Very little of interest has developed in the Border Field the past week. The Vanalta No. 2 is drilling under the gas found at 2,425 feet and expects to pick up a pay 75 feet below. The well has about 50 feet to go. The McDonald Forbo well on the Montana side is filling tankage at the rate of 70 bbls. daily and appears to be settling down to that figure for a steady production. The Cosmos No. 1 Iowa well that was producing oil, gas and water by heads last week has had some trouble shutting off this flow to drill deeper. The gas, oil and water were found at 2,408 feet in the Sunburst sand and three attempts at cementing have proved futile. Now the well has been mudded under pressure and another attempt will be made Payette County, encountered sufficient gas at an unnamed depth to blow sand and water 70 feet over the top. The hole then bridged and no estimate can be made of what the well will do. The last report available on this well is that it was shut down at 1,180 feet. Recently it resumed drilling. It is located in the town limits of Payette and near a well drilled on the Idaho Canning Co.'s property a year or two ago which encountered some gas at around 1,400 feet. The gas, according to President L. V. Patch, showed about one-half of a gallon of gasoline to the 1,000 feet. The Grand Teton Oil Co.'s No. 1 Blevins, SW SE, Section 33-5n-44, Teton County, is drilling below 1,930 feet after landing the 10-inch on bottom, and its No. 1 Bevan, NW SE, Section 28-5n-44, is drilling at 1,510 feet in the Frontier. The Moneida Oil Co.'s No. 1 Rose, NE, Section 32-14n-36, Clark County, is shut down at 1,140 feet.

MONTANA

The Browning Dome, Glacier County, in the northwest corner of Montana, appears due for several tests this spring. The Standard Oil Co. of California, the Cosmos Petroleum, Fulton Petroleum, Hannah Porter Oil Co., and The Texas Company, all hold leases on this newly surveyed structure and expect to drill wildcat tests. This structure lies close to the mountains and on the lands of the NE cor., Section 22-56-97, Byron Dome, is running 8⅝-inch casing at 4,607 feet.

Hot Springs County

The Ohio Oil Co.'s No. 1 Smith, SE NE, Section 9-46-99, Walker Dome, cemented the 10¾-inch at 3,132 feet and is waiting.

Park County

In Oregon Basin, the Lenco Petroleum Co.'s No. 2 Rousseau, Section 33-51-100, near a producer it completed in 1928, is spudding. The conductor pipe was set at 40 feet. The Wyoming Western Oil Co.'s No. 3 Hough, SE cor., Section 18-51-100, is fishing for tools at 4,596 feet. The Y-Tex Oil Co.'s No. 1, SE SW, Section 16-51-100, is spudding at 140 feet after skidding rig to start a new hole. The Cody Petroleum Co.'s No. 1-B Klindt, NE SW, Section 6-51-100, is drilling at 2,180 feet. The Oneida Oil Co.'s No. 1 Beck, SW cor., Section 28-52-100, is drilling at 2,215 feet. On the Frannie Dome, the Midwest Refining Co.'s No. 31 Rosenberg, SW NE, Section 25-58-98, cemented the 13-inch on bottom at 1,338 feet. This company's No. 31 Rosenberg, SW cor. SE, Section 24-58-98, is a location. This will test the northeast side of the structure. The Ohio Oil Co.'s No. 1 Burlington, SE SW, Section 21-53-101, Shoshone Dome, is drilling at 4,360 feet.

IDAHO

A report from the Sheppard Oil Field Service at Idaho Falls says the Idaho-Oregon Petroleum Co.'s No. 2 Idaho

(Continued on Page 246)

LA.-ARK. FIELDS

(Continued from Page 69)

and the latter a total depth of 3,058 feet. Magnolia has also made location for No. 2 Matlock, NW SW, Section 25-23-12. Olsan Brothers and Gordon Ingalls have made location for No. 1 Pine Woods Lumber Co. in the same section as has Phillips Petroleum Co. for No. 1 Floyd.

Henshaw and others announced four new locations in the Zwolle Field, three on the Sabine Lumber Co. lease in SE NE, Section 31-8-12, to be known as A-1, A-2 and A-3, derrick pattern being down for A-2. The same operators also made location for Sabine Lumber Co. B-1 in NW SE of the same section.

New entries in Zwolle are Ray Dawes Drilling Co. which has announced location for No. 1 Mansfield Hardwood Lumber Co. in Section 36-8-13, 5 miles north of the Blue Lake producing field; Arkansas Fuel Oil Co. (Arkansas Natural), which is rigging up No. 1 Nunn in SE NW, Section 32-8-12; C. L. Jett, trustee, who is rigging up for No. 1 Jones in Section 31-8-12; O'Brien Brothers, who are rigging up for No. 1 Colquitt in NW SW, Section 32-8-12, and E. C. Simmons who has derrick up for No. 1 Bolin in SE NW, Section 31-8-12.

Ohio Oil Co. is rigging up No. 3 Bowman-Hicks in SE SW, Section 33-8-12, offsetting No. 2 which is making 450 bbls. daily; and is also rigging up No. 4 Bowman-Hicks which is offsetting No. 1 Bowman-Hicks, a 45-bbl. pumper, the new test being in NE SW, Section 35-8-12.

Benedum & Trees are rigging up No. 1 Sabine Lumber Co. in SE NE, Section 34-8-12.

E. W. Bateman and others completed No. 2 Womble, Section 1-22-11, Sarepta district, Webster Parish, as a 100-bbl. pumper at total depth of 2,715 feet and are rigging up for No. 3 offsetting the pumper.

Lide and others have put No. 1 Dickson, SW SW, Section 10-19-14, Dixie district, Caddo Parish, Louisiana, on the beam and it is pumping 15 bbls. daily from total depth of 2,458 feet.

Arkansas Fuel Oil Co. tested a half million feet of gas in a drill stem test in Urania F-5, Section 24-10-1e, at 4,740 feet, a deep test in the Urania district of LaSalle Parish, Louisiana, and are arranging to drill deeper. Production in Urania is in the 1,400-1,500-foot zone.

Arkansas-Louisiana Pipe Line Co. abandoned No. 1 Harns, Section 22-9-21, Pope County, Arkansas, where this company obtained a commercial gasser several months ago in rank wildcat territory.

Jackson Oil & Gas Co. has temporarily abandoned No. 1 Mayes, Section 2-5-1e, Hinds County, Mississippi, which tested 2,000,000 feet of gas and 2,000 bbls. of brackish water at 2,585 feet and have made location for a second test a half mile north in Section 36-6-1e.

Gulf Refining Co. is making good progress on No. 1 Rainey, Section 13-5-1e, Rankin County, being down below 700 feet after setting 15½-inch casing at 88 feet.

Amerada Petroleum Corp. is coring at 4,350 feet in the Midway in No. 1 Campbell, Section 24-12-2, Yazoo County.

Alcorn Petroleum Co. is cleaning out hole in No. 1 Matthews, Section 14-2s-7e, Alcorn County, after shooting 100 quarts of nitroglycerin from 2,500-25 feet. Nothing but rainbows resulted from the shots so far.

KANSAS FIELDS

(Continued from Page 70)

SW cor. NW NE, Section 7-24-13, is a rig. Balliere and others' No. 1 Barnard, SW cor. NE, Section 32-22-10, has been abandoned at 2,471 feet. Derby Oil Co.'s No. 1 Beavers, NW cor. SW SE, Section 25-24-12, made 40 bbls. in sand 1,618-54 feet. McGinnis and others' No. 1 Henley, SW cor. NE, Section 23-25-9, has been abandoned at 2,228 feet.

Harvey County

Jolly & Ogg's No. 1 Schowalter, NE cor., Section 11-24-1w, is a dry hole at 3,760 feet. E. W. Marland, Inc.'s No. 1 Neiman, NE cor. SE, Section 8-24-2, has been abandoned at 3,511 feet.

Kingman County

White Eagle and others' No. 1 Lorenz, NE cor. SW SE, Section 25-27-5w, has been abandoned at 4,262 feet.

Lyon County

Sheedy and others' No. 1 Ewers, CEL NW, Section 4-21-10, is spudding. Bailliere and others' rig is up for No. 1 Hensley, SE cor. NE SE, Section 30-21-11.

McPherson County

Atlantic Oil Producing Co. made location for No. 1 Stuckey, CEL SE, Section 5-21-3w.

Morris County

Snyder & Rumback's No. 1 Drummond, C NW SE, Section 21-17-7, has been completed for 42,000 feet of gas in sand 664-74 feet.

Osborne County

Phillips Petroleum Co.'s No. 1 Grieve, NW cor. SE NE, Section 6-7-12w, is dry and abandoned at 4,389 feet.

Rice County

Allison & Fitzwilliams' No. 1 Mezger, SW cor. SE NE, Section 21-20-10w, is a rig under construction.

Riley County

Arkansas Fuel Oil Co.'s No. 1 Martin, SE cor. NE SW, Section 24-8-4, is dry and abandoned at 2,942 feet.

Sedgwick County

Mars Oil Co. is moving the rig in for No. 2 Miller, NE cor. SE SW, Section 2-26-2.

Smith County

Phillips Petroleum Co.'s No. 1 Clydesdale, SE cor. NW, Section 23-5-14w, is a dry hole at 4,184 feet.

Stevens County

Trees Oil Co. made location for No. 1 Lowery, C SE, Section 4-35-38w.

Sumner County

Champlin Oil & Refining Co. is erecting the rig for No. 5 Love, SW cor. NW SW, Section 9-30-2w. Davis and others' No. 1 McEwen, SE cor., Section 33-34-2, is dry and abandoned at 1,627 feet.

Woodson County

Derby Oil Co. and Spencer made location for No. 2 Kenyon, CNL SE NW, Section 29-23-15. Harper Oil & Gas Co.'s No. 3 Reed, CEL SW NE, Section 28-23-14, has been completed for 45 bbls. in sand 1,655-67 feet.

JOHN D. ROCKEFELLER, JR. REFUTES PRICE RUMORS

NEW YORK, Mar. 1.—John D. Rockefeller, Sr., has definitely retired from active management of the affairs of the companies in which he is interested, and has had no part in recent developments in the oil situation, said John D. Rockefeller, Jr., in a statement refuting various newspaper rumors concerning the alleged activities of his father in directing the recent cut in crude oil prices in the Mid-Continent.

Mr. Rockefeller's statement follows: "My attention has been called to recent statements that 'Rockefeller, Sr., Seen Heading Oil Trade War.' This contains statements and implications concerning my father which are not warranted by the facts. Many of them do not justify specific mention, but I must emphatically deny the statements that my father 'has again taken the initiative in dictating oil policies' and that it was he 'who directed Standard interests to order a cut in the price of Texas and Mid-Continent crude oil.' Naturally my father continues to be interested in anything pertaining to the oil industry to the development of which he gave so many years of his early life. However, since his retirement from the business more than a quarter of a century ago he has had nothing to do with the operation or management of any oil company or other business, much less the determination of oil policies whether in relation to prices or anything else.

"Neither my father nor I knew anything about the recent cut in crude oil prices until we read of it in the public press. The oil companies in which we are interested are managed and their business policies determined by their officers and directors and not by their stockholders."

35 CENTS a line first insertion; 25c a line each additional insertion. Cash in advance.

CLASSIFIED WANTS

CREATE AND BUILD BUSINESS

MAIL your advertisement now. It will be published next week. Cash with order.

FOR SALE—EQUIPMENT

FOR SALE, or rent. Complete Gasoline and Steam Rotary drilling rigs, at attractive prices. Texas Supply Company, Lorraine and Semmes Streets, Houston, Texas.

READY FOR IMMEDIATE SHIPMENT—PRICED RIGHT
50 MILES 4" O.D. PLAIN END PIPE
11 MILES 12" O.D. PLAIN END PIPE
15 MILES 4" STD. SCREW PIPE
60 MILES 2" STD. SCREW PIPE
All sizes in casing and line pipe from 2" to 15½" inclusive.
PRODUCERS PIPE & SUPPLY COMPANY
309 Kennedy Building
Tulsa, Oklahoma.

FOR SALE
Sweetland Filters—Nos. 1, 2, 7, 9, 10. 8—2" and 3" belt motor driven Kinney jacketed Pumps, Tanks, Boilers, etc. Send for complete lists. Stein-Brill Corporation, 25 Church Street, New York, N. Y.

FOR SALE. 8 Sweetland Filter Presses, No. 12, No. 10, No. 9, No. 7, No. 2; 1—300 H. P. Scotch Marine Boiler; Miscellaneous—Compressors, Storage Tanks, Pumps. CONSOLIDATED PRODUCTS COMPANY, 17-20 PARK ROW, NEW YORK CITY. BARCLAY 0600.

TANK CARS—FOR SALE

Eight thousand gallons, now in gasoline service. Inspection at Houston, Tex.

Bargain Prices.

M. R. DUCEY RY. CAR CO.
Houston, Texas.

FOR SALE—MACHINE TOOLS
Bargains in used and rebuilt lathes, shapers, drill presses, pipe machines, milling machines. Five hundred machines in stock. Terms to responsible parties. Write for catalog.
Cincinnati Machinery & Supply Co.
26 West Second St., Cincinnati, Ohio.

FOR SALE—Used Machine Tools and shop equipment in stock for quick delivery. Terms if desired.
HUEY & PHILP
Dallas, Texas

FOR SALE
1 No. 3 National Drilling Engine complete; has drilled only two wells and is in A-1 condition. Machine located near Clovis, New Mexico. For information write International Supply Company, Artesia, New Mexico.

BELTING—8" 6-ply A.P.I. special. 80c per foot. F.O.B., K. C., Mo. M. Eichenberg, 1512 Locust St.

FOR SALE—1 6x10 Fairbanks Morse Power Pump complete. 2 4x10 Fairbanks Morse coalinga Pattern Power Pumps complete. These pumps are new and are offered at half price. Write P. O. Box 1777, Houston, Texas.

FOR SALE
Standard rig and string of tools. Or will trade for proven acreage or royalty. Dorsey E. Straitiff, Box 592, Casper, Wyo.

MANUFACTURERS, Cotton and Wool Waste, Sanitary Wipers, Cheese Cloth and Mill Ends. Immediate shipment, a bale to a carload. American Wiper and Waste Mills, 511-13 Broadway, Kansas City, Mo.

FOR SALE—Used Pipe and Casing, 7,000 feet 6⅝-inch 24 lb. LW, 12,000 feet 4-inch 8-Thd. Line.
Elliott Machine & Supply Co.,
Depew, Okla.

FOR SALE—by owner. 60,000 feet 2-inch to 6-inch Line Pipe, Gas Engines, Compressors, Vacuum Pump, Tanks, Buildings. All miscellaneous equipment of gasoline plant which we are dismantling 2½ miles southeast of Broken Arrow, Okla. Arrow Gasoline Co., P. O. Box 434, Tulsa, Okla.

FOR SALE—Complete Compression Gasoline Plant with Miller DC engines, tanks, etc. Condition Good. Near Tulsa. Biddle 4-1618.

FOR SALE—EQUIPMENT

FOR SALE—Low Pressure Gasoline Absorption, Capacity of Compressors 1,750,000 cubic feet per day. Absorption Unit 8,000 gallons. Located Central Texas. H. H. Adams, W. T. Waggoner Building, Fort Worth, Texas.

FOR SALE—Machine Tools, 24-inch by 16-foot Lodge and Shipley Lathe and 30-inch by 20-foot Grd. Head M. D. Taper Att. and 24-inch Crank Shaper Single Pulley. Bargains. Location, Kansas.
Elliott and Stephens Machinery Co.,
St. Louis, Missouri

FOR SALE OR TRADE
Reconditioned pipe, casing and Oil Field Supplies. Also Gasoline Plant Equipment. Lee Morrison Supply Co., Bartlesville, Okla. Branch yd. at Sand Springs, Okla.

EQUIPMENT WANTED

WANTED TO PURCHASE one diamond core drill outfit capable of going 1,500 feet. Give full information, location, condition and cash price. Write Box E-127, The Oil and Gas Journal, Tulsa, Okla.

BUSINESS OPPORTUNITIES

OIL LOCATED before drilling. Geophysical method. Toggodometer Instrument; take pay in oil. No oil, no pay, except traveling and testing expenses. 95 per cent accuracy. O. P. Coffin, Caddo, Tex.

FOR SALE—Whitetail Oil Syndicate Units, at par $100.00, covering 47,000 acres, now drilling, N. E. Montana. Good geology. G. H. Lowe, Trustee, Neillsville, Wisconsin.

FOR SALE—One-half interest in paying Tractor operated farm, 6,000 acres fertile plains land, solid body. Will return better than 10 per cent net and increasing in value. Located on approved structure, all minerals intact. E. L. Woodley, owner, Ropesville, Tex.

YOURS for fewer wells, but better wells, and less failures. Particulars about my instrument and method of locating, free and without obligation. Address Box E-120, The Oil and Gas Journal, Tulsa, Okla.

I HAVE PATENTS pending on a distillation unit of my own design. Desire correspondence preferably with small producers who desire to branch out into the refining business cheaply. Address P.O. Box 83, Compton, Calif.

SUB-ZERO WEATHER, January 17th, last, blew in Chapman's gusher wildcat Abbot, S. E. Williamson County, Texas, on long-known Luling-Mexia-Fault Strike, 2½ miles from Milam County line. I have an honest-to-square-shooter, solid gold, lead pipe cinch proposition in Milam County by Major Company's drill stem proved-up geology under Luling-Mexia Fault, to put in hands of oil men with money who know their stuff. Been here ten years; got the low-down dope on all that's been done. Four wells got saturation oil and gas. Come see me. C. F. Drake, Box 716, Rockdale, Texas.

A NEW CABLE-TOOL BIT, patent 1698873, designed for soft or sticky formations, to compete with a rotary in speed. I have been using one similar for four years on a small machine with wonderful success and now want it introduced. Other interests prohibit me giving this my personal attention, so would like to make a deal with some responsible party to handle patent on percentage, or would sell outright. Contractor, if you want to try me out, will send dope to any tool shop. Patent brokers save your stamps. R. Burke, 225 Oxford, Lindsay, Calif.

HAVE GOOD DEPOSITS gold, silver, lead and copper near highway just opened. Need concentrator to work ore on ground. Will give bargain. C. J. Greene, Sells, Arizona.

BUSINESS OPPORTUNITIES

BLOCK 1,400 Acres. Well being drilled close. For sale. Will divide for test. Good structure. Located in Indiana. Address H. Fisher, Terre Haute, Indiana.

FOR SALE—Acreage on one of the largest structures in Southeast New Mexico. Drilling in progress. Henry E. Meyer, 410 Kings Court, San Antonio, Texas.

MINERAL RIGHTS FOR SALE
170,000 acres northern New Mexico. Some coal. Structure favorable for oil. K. A. Heron. Chama. N. Mex.

YOU can make BIG money helping to develop the gold mining industry of Colombia, South America. For particulars address Davidson, 201 First National Bank. Denver. Colo.

FOR SALE, or lease, on royalty basis a combination Gas Regulator and Safety Device. Patented. For full information write P. O. Box 14. Wilmot. Kansas.

If we do not maintain a classification exactly suited to the type of advertisement you wish to run, we shall be glad to create a fitting one.

WANTED

DRILLING CONTRACT wanted for an interest in 10,000 acres on definite structure determined by geologist of wide experience. Leroy Taylor, Box 1096, Seminole, Okla.

WANT DRILLING CONTRACT
Culberson, Hudspeth, El Paso Counties.
Palm Milby, P. O. Box 247,
Clint, Texas.

WANT 20 to 30 barrels settled shallow production. Depth 300 to 600 feet. Prefer around San Antonio or Fort Worth, Texas.
L. W. Harriss,
Autrey Oil Co.,
Haughton, La.

PATENT ATTORNEYS

LOYAL J. MILLER
Registered Patent Attorney.
626 Insurance Building,
Oklahoma City, Okla. Phone 3-1743.

REGISTERED PATENT ATTORNEYS
United States and Canada.
Before disclosing your invention to anyone, send for blank form,
Evidence of Conception.
Bulletin "How to Establish Your Rights" and complete information free.

LANCASTER, ALLWINE & ROMMEL
240 Ouray Bldg., Washington. D. C.

INVENTORS who derive largest profits know and heed certain simple but vital facts before applying for patents. Our book, Patent-Sense, gives those facts. Free. Write Lacey and Lacey, 677 F. Street, Washington, D. C. Established 1869.

MONEY RAISING

CAPITAL — An experienced, dependable broker will aid in financing propositions of merit. Amster Leonard, East Orange, N. J.

DO YOU NEED MONEY for organizing or financing oil or mining deals? Write 2443 N. W. 12th. Oklahoma City

FINANCE YOUR OWN project with shares bonded. Quickest, most satisfactory known method of raising capital. Information free. Bankers Interstate Security. Electric Bldg., Denver, Colo.

BULLETIN, containing information of priceless value to responsible parties seeking capital, yours upon request. Free analysis and advice cheerfully given. Moderate rates. Prompt. Service. Morris, Financing Specialist, 3608 Warren St., Philadelphia. Penna.

INQUIRIES SOLICITED FROM CORPORATION interested in raising capital through marketing of corporate securities.
THE BROOKWORTH CO., INC.,
110 East 42nd St., New York City.

HELP WANTED

MECHANICAL ENGINEER wanted by Established Oil Well Equipment Manufacturers. Must be thoroughly experienced in designing and developing Rotary Drilling Equipment. Splendid opportunity for the right man. References and full information as to experience must accompany application. Write Box E-113, The Oil and Gas Journal, Tulsa, Okla.

WANTED
Technical expert with experience in and capable of Design, Construction and Operation of carbon black manufacturing plants with experience in testing methods and apparatus and with knowledge of analytical methods of determining quality of carbon black suitable for various industrial applications. Must be willing to go abroad. Write full particulars. Answer Box E-111, The Oil and Gas Journal, Tulsa. Okla.

REFINERY SUPERINTENDENT
To take charge of small skimming plant for Company with established markets. Applicant must be thoroughly familiar with treating gasoline and kerosene. In answering give full details as to references, experience, salary expected and when able to report for duty. Write Box E-117, The Oil and Gas Journal, Tulsa. Okla.

RESEARCH CHEMIST WANTED—Experienced in research and development refining petroleum and its by-products. In reply state age, training and experience. Address White Star Refining Co., 903 West Grand Blvd., Detroit, Mich.

POSITIONS WANTED

PURCHASING AGENT. With a background of 18 years experience in oil and gas engineering field work wishes to make a change. Engineering education and an experienced executive. Write Box E-68, The Oil and Gas Journal. Tulsa, Okla.

GAS ENGINEER with 18 years experience in all phases of oil and gas work, desires position as gas engineer or superintendent. Correspondence desired. Write Box E-67, The Oil and Gas Journal, Tulsa, Okla.

POSITION WANTED
Gas Tester and Meter Man. Five years experience in Oklahoma and Texas. Mid-Continent field preferred. Capable of taking charge of Gas Department. Ten years previous experience as Civil and Mining Engineer. Write Box E-114, The Oil and Gas Journal. Tulsa. Okla.

TRAVELING AUDITOR AND ACCOUNTANT, experienced, thoroughly familiar and capable of handling all phases of oil industry accounting. Domestic and foreign experience. A-1 references, surety bond and no drinker. Desires position with a reliable company. Available about March 1. Write Box E-121, The Oil and Gas Journal, Tulsa, Okla.

PIPE LINE SUPERINTENDENT. Fifteen years experience in oil pipe line construction, operation and maintenance. References. Write Box E-128, The Oil and Gas Journal, Tulsa, Okla.

MECHANICAL Engineer, age 27, with 6 years' varied experience on construction gasoline plants, pipe lines, marketing, buildings. Good general knowledge of industry, except production. Engaged in sales work at present. Desires position with major oil company in construction, maintenance or marketing. Write Box E-126, The Oil and Gas Journal, Tulsa, Okla.

REAL ESTATE

$10 MONTHLY acquires 5 acres pecans, figs, oranges. Cared for. Suburban Orchards. Dept. J. Biloxi. Miss.

ANNOUNCEMENT

C. E. LOEB SAVOY
Attorney-At-Law
1116 American Bank Building
NEW ORLEANS, LOUISIANA
announces the opening of a department specializing in the examination of Louisiana abstracts of title for oil operators, giving special attention to matters in escrow.

35 CENTS a line first insertion; 25c a line each additional insertion. Cash in advance.

CLASSIFIED WANTS

CREATE AND BUILD BUSINESS

MAIL your advertisement now. It will be published next week. Cash with order.

EMPLOYMENT SERVICE

CHEMISTS, Draftsmen, Designers, Oil Field Engrs., Geologists, Scouts, Production Men, Oil Refy. Oprs., Repairmen, Engrs., etc. Calls daily. Write or wire, give age, detail experience. Interstate Co., Security Bldg., Denver, Colo. Men-finders built thru 25 years world-wide service. Largest in west.

LEASES—PRODUCTION

FOR LEASE—25,000 acres Prospective Oil Land in Coahuila, Mexico. Rights confirmed to owner by Mexican Government. S. R. Gonzales, Naranjo 2, Altavista. Tampico, Mexico.

OIL LEASES—In and around the fine productive oil fields of Texas. Will sell blocks of acreage of any size. If it is money that you want, get in touch with me. N. M. Bullock, Rockdale, Tex.

FOR SALE Oklahoma, Kansas and New Mexico 5 and 10-year oil and gas leases in large and small blocks. Also Oklahoma and New Mexico royalties. Robert O. Zielinski, 12836 Wood St., Blue Island, Ill.

BUY CHEAP LEASE and royalty in Western Oklahoma ahead of development. For particulars write George F. Fisher & Son, 607 Cotton Exchange Bldg., Oklahoma City, Okla.

FOR SALE—Oil and Gas Leases, shallow field, Anderson County, Kansas. New development started. Cash and drilling contract wanted. W. L. Morris, Garnett, Kansas.

FOR SALE—Leases and Royalties, Lincoln, McClain and Grady Counties, Okla. Bandara, Edwards, Kinney and Val Verde Counties, Texas. Bloch, 3-8114, P. O. Box 531, Tulsa, Okla.

OWNERS OF APPROXIMATELY 13 THOUSAND acres in northeast Clark County, Kansas, have joined together in a well situated block, clear of all leases, excepting approximately five hundred acres. Would like to lease block to financially responsible parties, who are able and willing to carry through development of any oil possibilities which may exist. Write Box E-118, The Oil and Gas Journal, Tulsa, Okla.

FOR SALE: Oil leases and Perpetual Warranty Deeded oil royalty located in the active areas of New Mexico's great Potential oil fields, Lea County. Huge profits are being made. Why not get in now? Prices are yet low. Write for information and late oil development map free. Monarch Inv. Co., Roswell, N. M.

FOR SALE quick gamble, 80-acre lease direct offset to Wilcox sand test, Twenty-five dollars per acre. Well now drilling below 1,800 feet on proven high. P. O. Box 845, Muskogee, Okla.

LEASE AND TWENTY PRODUCING WELLS. About 1,200 barrels daily. Muskogen, Michigan, field. J. B. Azbill and Company, Inc., Paul Brown Bldg., St. Louis, Mo.

WANT TO BUY producing lease in shallow field which has good future. Mean business. Write Box E-129, The Oil and Gas Journal, Tulsa, Okla.

VAN ZANDT COUNTY, TEXAS—Leases, Royalties and Drilling Blocks. The hottest play in Texas. Leases advanced 500 per cent in last 60 days. Write or phone Fort Worth or Canton office.

L. R. Barton & Co.,
414 Dan Waggoner Bldg.,
Fort Worth, Tex.;
First National Bank Bldg.,
Canton, Tex.

WILL SELL ¾ working interest in 210 acre lease near discovery well, New Niagara, Henderson County, Ky., pool 60 days to start first well. Address Suite 9, No. 13,708 Madison Ave., Cleveland, Ohio.

COOKE COUNTY, TEXAS, LEASES. Five-year leases, 1 to 3 miles from well now drilling. Good geology. $2 to $6 per acre. W. R. Andrews, Box 7, Gainesville, Tex.

LEASES—PRODUCTION

FOR SALE—25,000 acres, 10-year paid up leases, Uvalde, Edwards, Kinney, Bandera and Real Counties, Texas. No rentals. $1.35 per acre. L. W. Stieren, Alamo Bank Bldg., San Antonio, Tex.

I HAVE A DRILLING PROPOSITION that will interest you in the newest shallow sand oil and gas producing district of Western Kentucky. Write me for particulars. Joel Bailey, 310 Mercantile Bank Bldg., Evansville, Indiana.

SHOULD OPEN AN OIL FIELD
Have started operation for drilling on wonderful structure in Colorado near New Mexico line, that looks like a sure shot for oil. Have already moved in tools and completed 84-foot derrick, ready to spud in. If you are interested in some close-in leases, feel sure that $100 or $200 invested may make you a fortune. Will send full particulars on request.
Out West Investment Company,
Continental Oil Building,
Denver, Colorado.

WILL SELL NEW LEASE N. W., Quarter 7, 12N, 2 East, Lincoln County, Oklahoma. $4,000.00. 11 miles from Nicoma Park well and about 15 from Chandler field. Land unencumbered and on crest of divide field between Deep Fork and North Canadian. G. A. Minnich, Carroll, Iowa.

FOR SALE. All, or part of my Proven and Semi-proven Oil and Gas leases and royalties in Ark., and La. New Fields. Must drill four wells soon. To right party will give enough time to raise money. Price $50,000.00. For particulars address J. S. Dashko, El Dorado, Ark.

40 ACRE LEASE on well defined structure 1¾ miles S. E. of Gulf Well now drilling in Wood County. Price $15.00 per acre. L. D. Bertillion, Mineola, Texas.

40-ACRE LEASE between Van Pool in Van Zandt County and No. 1 Bailey, near No. 1 Bailey. Will sell one-fourth royalty. Alex Norton, Ben Wheeler, Tex.

WEST TEXAS mineral lands $2.50. Ten and twenty year leases, $1.25 and $1.50. Joe Cunningham, Big Spring, Texas.

60-ACRE LEASE, Van Structure, NE $7 per acre. ⅛ of landowner's royalty free. Tyler, 1130 Cedar Hill Ave., Dallas, Tex.

OIL INDUSTRY PRINTING

OIL FIELD LEGAL BLANKS
1930 CATALOG NOW READY
Leases, assignments, releases, township, plat books, well records, etc. Request on your letterhead gets free catalog. Olds Press, 215 East Third St., Tulsa, Okla.

LOOSE LEAF LEDGER SHEETS, special Ruled office forms. Send your copies for estimate. Quick service. Acme Ruling Co., 114 N. Third St., St. Louis, Mo.

FOR SALE—MAPS

NEW MAP OF
MID-CONTINENT OIL FIELDS
Suitable for pocket or desk top, showing counties and producing areas in Oklahoma, Kansas, Texas, Arkansas, Louisiana and Eastern New Mexico. Postpaid for $1.
KELLY MAP CO.
P. O. Box 1773. Tulsa. Okla.

OIL DEVELOPMENT maps, any county in Oklahoma and west Texas. 75c each. State, county and district maps showing oil development. Lindsay Map Co., Franklin Bldg., Oklahoma City, Okla.

ZINGERY OIL MAP CO.
Makers of famous Zingery abstract maps.
813 Throckmorton Ft. Worth, Texas.

INCORPORATIONS

CHARTERS—Delaware best, quickest, cheapest, most liberal. Free forms. Colonial Charter Co., Wilmington, Del.

DELAWARE incorporator. Charter fees small, forms. Charles G. Guyer, 901 Market St., Wilmington, Del.

ROYALTIES—PRODUCTION

FOR SALE—ROYALTIES. Belcones Fault, L. W. Stieren, Alamo Bank Bldg., San Antonio, Tex.

STEVENS COUNTY and other Western Kansas Counties and Beaver County and other Western Oklahoma Counties royalties and leases.
Sain and Company, Liberal, Kans.

NEW ROYALTY LIST. Van Zandt County, Texas; also Okla. and Kans. royalty. Harry Haynes, Grantville, Kansas.

ROYALTY INTERESTS, Van Zandt, Smith, Wood, Henderson, Anderson and Ector Counties, Tex. Lists and maps. James R. Haynes, Grantville, Kan.

FOR SALE—OKLAHOMA COUNTY ROYALTIES. H. T. Orcutt, 1106 Colcord Bldg., Oklahoma City, Okla.

ROYALTY BARGAINS in Oklahoma, Lincoln and Pott Counties for sale. American Inv. Co., 201 Elks Bldg., Oklahoma City, Okla.

We Handle Oil Leases and Royalties.
RATLIFF AND CO.
630-31 Security Bldg. 3-7881; L. D. 594
Oklahoma City, Okla.

OIL
Play your money safe—$100, half cash, buys choice lot College Park addition to Oklahoma City. Warranted deed, full royalty under Buttram Petroleum Co. community lease. Write or phone for particulars. George Fisher & Sons, 607-8 Cotton Exchange Bldg., Okla. City, Okla.

WANTED—Oil Royalties, oil and gas production and acreage. Full particulars to F. Martin, 31 Fort Hill Circle, St. George SI. N. Y.

ECTOR COUNTY—4th well 1,500 bbls. Royalty interest $40 to $100, ¼ cash, balance monthly. C. H. C. Anderson, Linz Building, Dallas, Tex.

OIL ROYALTY for sale, seven-eighths Mineral Deed, 82 Sections Brewster County. Price $1.50 acre. Other Royalties, Leases. Box 244, San Angelo, Tex.

VAN ZANDT and East Texas Royalties, Leases under and near major blocks, $2 up. Inquiries invited. Lists. J. M. Ferguson, Box 1326, Fort Worth, Texas.

COOKE COUNTY, TEXAS, ROYALTIES
One-fourth of owner's one-eighth royalty under 289 acres with well drilling on same. Very low price. All of owner's one-eighth royalty on 160 acres within quarter mile of well now drilling.
W. R. Andrews, Box 7, Gainesville, Texas.

PERPETUAL ROYALTIES
On structure and in the major company blocks, in northwestern Oklahoma. Woods, Harper, Major, Woodward and Blaine Counties.
G. D. Mansur
416 Equity Bldg., Oklahoma City, Okla.
Phone 7-2666

WIDOW WILL SELL 1 to 10 acres royalty Van Zandt County, Texas, under test. One-fourth acre $72, one-half acre $112, full acre $200. Possibly worth $5,000 acre in 60 days. Manley, 313 Herskowitz Building, Oklahoma City, Oklahoma.

AN EXPERIENCED, DEPENDABLE BROKER specializing Oklahoma City Field royalty offers excellent bargains. Joe P. Crawford, Petroleum Bldg., Oklahoma City, Okla.

BEDROCK ROYALTY PRICES ahead of drilling on major company blocks. $6 per square mile. Perpetual deeds and title warranty. Clearly stated and understandable interests. See maps and bulletins. R. R. Fisk, Box 1214-B, Wichita Falls, Texas.

BUY ROYALTY UNDER 600 ACRES OKLAHOMA County located in 4 location under many different leases. Deed to 1/640th of Landowner's ¼th of all oil under 600 acres $375.00. 2/640th $570.00, 3/640th $1,125.00, 4/640th $1,500.00, limit buy to anyone, 10/64th $3,750.00. Full information write Milam Oil Investments, 204 Oil Exchange Building, Oklahoma City, Oklahoma.

FOR SALE—Royalty interests in Van Zandt, Smith, Wood and Henderson Counties. Van Pool, latest and biggest pool. G. M. Alsup, Grand Saline, Tex.

ROYALTIES—PRODUCTION

JACK COUNTY ROYALTY—One-half royalty, 1,000 acres North and East Half Jack County. James T. Cumley, Wichita Falls, Texas.

ROYALTIES IN ECTOR, Winkler and Pecos Counties, Texas. J. B. Azbill and Company, Inc., Paul Brown Bldg., St. Louis, Mo.

$150 INVESTED IN MONTANA ROYALTIES has paid $35,000. Free information sent concerning present advantageous offers, producing and ahead of the drill. Bonded broker. A. H. Raymond, Box 1776, Great Falls, Montana.

SEVERAL HUNDRED acres of royalty for sale in eastern part of Oklahoma County, Oklahoma. Advise me where you are interested. Shirley Thompson, Jones, Okla.

WE WANT good oil and gas royalties. Send us full information with reports. U. S. Royalties Corporation, C. A. Johnson Bldg., Denver, Colo.

RICE COUNTY ACREAGE
and close to Royalties for sale. Also interest in well and 3,000 acres. G. W. Moore, Independence, Kansas.

BUY ROYALTY. The royalty that sells for a few dollars today is the high priced production royalty of tomorrow. We have it at all prices. ELMER S. and FOX WOOD, 712 Herskowitz Building, Oklahoma City, Okla. Phone. 7-3514.

VAN POOL
PRODUCING OIL ROYALTY
We offer for sale subject to our confirmation 1/16 of the Royalty the Majors 72½-acre tract Van Pool, 1 Producing well. This property is in the midst of the Pure Company holdings. Base Price $2,700. Total consideration $12,233.
AMERICAN NATIONAL
BROKERAGE CO.
(Established 1922)
E. T. Marion, Manager
512 Southwestern Life Bldg.
Dallas, Texas.

ADVERTISING RATES

	1 Time	2 Times	3 Times	1 Mo.
3 lines	1.05	1.80	2.25	3.30
4 lines	1.40	2.40	3.40	4.40
5 lines	1.75	3.00	4.25	5.50
6 lines	2.10	3.60	5.10	6.60
7 lines	2.45	4.20	5.95	7.70
8 lines	2.80	4.80	6.80	8.80
9 lines	3.15	5.40	7.65	9.90
10 lines	3.50	6.00	8.50	11.00

(Six words usually make a line)
Compute white space at the above rates.
Mail your advertisement to

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

BUY DEEDED OIL ROYALTY interest Oklahoma County. 1/640th of Landowner's 1/8th of ALL OIL under 10 acres—$8.00, 40 acres $25.00, 80 acres $50.00. Act quick. Full information. Joe Milam 205 Oil Exchange Building, Oklahoma City, Okla.

GOOD ROYALTY PROPOSITION
We want Eastern representatives to handle good royalty proposition. Wood Petroleum and Royalty Corporation, 712 Herskowitz Building, Oklahoma City, Okla.

WANT producing, non-producing royalties Seminole Field; am interested drilling block close production. J. A. Harrison, 423 Kennedy Building, Tulsa, Okla.

ROYALTY in McCurtain County for sale in large or small tracts, abstracts of title with each conveyance. Luther Calahan, Idabel, Okla.

ADVERTISING

ADVERTISING. I get results selling stocks, bonds, royalties by mail. Rates reasonable. Write to R. E. House, 1123 No. Oklahoma, Oklahoma City, Okla.

Weather Helps Chicago Furnace Oil

But Buying Is in Small Quantities With Prices Unchanged. Gasoline Shipments on Contracts Improve; Spot Market Light

By J. B. Waldo

CHICAGO, Mar. 3.—The colder weather of Sunday brought in some instructions against contracts for furnace oils. The buying was limited to small quantities and the distributers bought only for a small demand. The prices were unchanged from the close of last week, the market having an easy tone for all furnace oils. Major refiners stated they were receiving shipping instructions on their gasoline contracts in large amounts and more readily than during the corresponding period of last month. Spot gasoline buying continued light, there being only a limited number of actual orders placed for gasoline and much shopping around for a price. The major refiners' idea of the spot price continued to be 6½ cents, while the open market price had a narrow range of 5¾ to 5⅞ cents. These prices were not for Oklahoma material, some of the gasoline available at these prices coming from North Texas or from Louisiana, but it is stated that it is acceptable material. Demand for lighter gravities continues only fair and prices were not changed.

Kerosene Not Active

The kerosene demand was not active and refiners who are seeking orders from the jobbers stated that the latter had in many instances stocked enough to carry them through the first part of the season and that there would be only a small demand until the consumption shows some increases. Only a limited number of inquiries for industrial fuel oils were in the market and some of the buyers who usually purchase regularly at the first of the month were not interested in the market at present. Local gasoline distributors had a fair business over the week-end, but not so good as the preceding as the weather was colder with some snowfall.

Fine Weather Increases Consumption

There is no doubt that the fine weather of last month has greatly increased the consumption of gasoline. The estimates of the increased distribution vary from 7 to over 20 per cent. The lower estimates are made by smaller companies which have not increased the number of their stations and probably represent the actual increase in the quantity of gasoline consumed in their territory, while the larger estimates not only cover a larger area but are made by distributing organizations which have added materially to their outlets both by construction and by the purchase of established companies with distribution of their own.

The location of a distributor has had much to do with the amount of the gasoline sold. During the middle of last week, the northwestern part of this territory was visited by one of the worst snowstorms in its history and the worst this season, while the central and southern parts were spared. The result is that those stations in the northwest will have a material reduction in their business while those in the vicinity of Chicago are enjoying to the full the prevailing bright, cheerful weather with its appeal to both the motorist and the dealer.

Over the middle and southern part of the territory the hard roads are free to the motorists but the soft roads are practically impassable and in most of the counties the highway commissions have barred trucks from the soft roads. Oil jobbers have stated during the week that it was impossible for their trucks to go to the farm trade and that the farmer if he came to town came on horseback or afoot.

Contract Business Improved

The Chicago gasoline market was not much more active than it had been during the preceding week. There was some improvement but it was more in the movement on contract than in the spot demand. Distributors who operate on a marginal contract were taking their quotas much more generally and shipping instructions were being placed for March with less resistance than during February, although there was an improvement during the latter part of February.

Refiners reported that the gain in their shipments over the latter part of February was marked. Week-ends during February were generally favorable to motoring and on the last one in the month Chicago witnessed a real revival of Sunday driving.

There was little change in the price situation. The major refiners continued to hold their spot price all of the week at 6½ cents, Group 3, for U. S. Motor gasoline. Their spot sales continued to be small. The number of spot buyers has been reduced by mergers and purchases of independent oil companies, but there are still many who buy in the spot market if those be included who do not contract for their full needs but purchase more or less gasoline in the open market.

There was on the whole more activity than during the preceding week. The spot price at Group 3 supposedly has been 5⅝ to 5¾ cents for resale, which would mean a market for the jobber of at least 5¾ to 6 cents, but entirely responsible jobbers have said they could buy for 30 days' delivery at 5½ cents and one sale was made by a responsible refinery to a downstate jobber of 50 cars of U. S. Motor gasoline for delivery over March at 5½ cents.

Chicago Innocent Here

Chicago is accused of being a dumping ground but this sale was not made through Chicago at all, but between the downstate jobber and the Mid-Continent refiner and it tends to bear out the statement made earlier in the week that gasoline of good quality could be had at that price. The only explanation that seems possible for such prices is that there is more gasoline which needs a purchaser than the demand even at its present increased proportions from last year can absorb.

In addition to these new offerings, there is gasoline bought for February delivery which had not been ordered out and which had been purchased at prices as low as 5⅜ cents. Gasoline bought from the Indian Refining Co., when it was reducing its stocks, can be sold for delivery in the states east of the Mississippi River at even lower prices delivered than the gasoline bought at the prices named, and this differential point gasoline will have to be reckoned with during the season. In fact, there are many oil men here who believe that the shipping of gasoline by water to the North Atlantic ports will be on a more extensive scale this year than it was in 1929. They assert that during the coming season as during the summer of 1929 the refiners in the Allegheny regions will have little or no demand from the East Coast and will be forced to push for business in the eastern parts of this territory and of Ohio.

Last year and in 1928 California gasoline was being delivered as far west as Detroit and occasionally to some parts of Indiana. In this territory there is at present a greatly enlarged refining capacity including refineries which are not operating and the older refineries without exception are capable of turning out more gasoline and other products than they were a year ago. These refineries are now operating at a greater percentage of their capacity than those of any other section of the refining industry.

Quiet Demand for Higher Gravities

The demand for the higher gravities has been quiet and, in spite of reports of purchases of the 400 and the 375 endpoints for export, the prices quoted have been a little lower than during the preceding week. The 375 endpoint has been selling here at 7 cents for fairly prompt delivery and the 400 endpoint at 6 cents with the "Sixty Navy" sold by some refiners almost as a regular matter of course at the same price as quoted by them for their U. S. Motor grade.

There is little new in conditions in the eastern part of the territory. In Detroit, where the tank wagon price is now regular, some gasoline is reported to have been offered at a small fraction over 8 cents delivered. The practice of blending West Texas naphthas with natural gasoline has been popular and quantities of these naphthas and gasoline have been moved by jobbers, but right now the low price of gasoline is working against the practice as the cost of the naphthas and the casinghead gasoline is greater than the price at which U. S. Motor is being sold unless an inferior grade of both naphtha and natural gasoline is used.

The market for natural gasoline has been somewhat stronger and prices have ruled a little higher. The Ethyl product is still popular with motorists and it is something of a question with the blenders whether they can be sure of an ample supply of the Ethyl fluid to blend during the height of the season.

Kerosene Inactive

Kerosene was not active last week. It is still early for any important demand for kerosene as tractor fuel. Some jobbers have a demand for other purposes and maintain a small stock at all times which they increase with the coming of the tractor season which usually lasts from the middle of March to the first part of May depending on the locality and the season. There were some advances in price by refiners who in several cases put up their cost for the 41-43 gravity to 4¼ cents, but others were still selling at 4 cents direct to the jobber and taking orders for delivery over March.

Little that is cheering can be said of distillates and other forms of furnace fuel. The new business has been practically nil, and the chief activity has been trying to induce the distributors to take in the rest of undelivered orders. Shipping instructions have been hard to get and there are a great number of unfilled orders on which the refiner is pushing for some sort of settlement. It might be embarrassing to some if the weather should turn cold and the buyers begin to ask for deliveries. They might be as unreasonable then as the refiners believe that the buyers are now in refusing to accept deliveries. In this market it has been practically "write your own ticket" with regard to distillates and zero gas oils, that is, if a buyer could be found.

Perhaps one of the reasons for the low prices is that the refiners expect to make the original buyer stand whatever the refiners may lose on the sale if they sell the material at a lower price than it was sold for at first sale.

Greater Reaction in Distillates

The distillate market has reacted to a greater extent than gas oil. It is hard to say what the spot market was last week with so little demand and so many anxious to sell even a single car. Some excellent distillate full 38-40 and desirable in every way was offered freely at 3 cents, Group 3, with no buyers to speak of. One of the large local plants was also selling at this price, its product being close to a prime white in color and with a low flash. This competition has been felt in the market and indicates the meager nature of the demand.

Gas oils are holding some better than distillates but there is an easy tone to the market for zero gas oils and sales of dark gas oil have been made as low as 2⅞ cents. The light fuel oils with a good flash which are suitable for furnace oil have also weakened, and, while quotations are made of $1.05, some oil is available at $1. Some 28-30 fuel oil was offered a buyer at 90 cents but he did not order as he said that there must be something the matter with the oil to cause such a low price. The oil may have been all that was said for it, but many of the low prices doubtless have been made on material that was not full specification. Sometimes the oil was really too good for the purpose for which it would be used but it did not fit into the distributors' plans or match his previous stocks of that kind of oil.

There has been little change in straightrun gas oil. The gas companies are not buying any more freely than they did and are using comparatively little gas oil.

End of Peak Consumption Near

The season of largest consumption is rapidly approaching an end, and the purchasing agents are little interested in considering offers. One of the good gas companies, although not a large one, stated last week that it was offered a good straightrun gas oil at 2⅜ cents and that the highest price quoted of late had been 2½ cents. Buyers of smaller quantities are sometimes asked a little more than that price.

Heavy fuel oils are quiet. There is considerable movement on contracts but little new business is being placed and many industries are not using their regular quantities. The average industrial manager is operating conservatively and is not buying in excess of known requirements. There has not been as general a revival of business as was hoped for and there are numerous plants which are not operating to even a fair proportion of their possible capacity.

The demand for heavy oils for heating also has been much less than usual and the trade figures that when the March requirements for heating are supplied most of the consumption will be provided for for this season, and that any demand for heating oils will be small after the March purchases have been consumed. The result is that even the buyers of monthly quotas are stating in many cases that they have enough oil left in their tanks as a result of the decreased demand during February to carry them well into March and that they will not buy until later and then a few cars at a time as they need them.

Larger Refiners Hold Prices

As has been the case with other products, the larger refiners have been holding their prices with comparatively little wavering, but there have been free offerings of fuel oils of various types and grades at decided concessions. One of the active dealers in fuel oils was asked regarding prices and he said that he would like nothing better than to have a desk covered with orders for (18-22 zero) fuel oil at 70 cents, and when asked how much he could make per barrel stated that he could make from

(Continued on Page 236)

Lower Prices Mark East Coast Trade

Whole Situation in Refined Products Is Soft, With Demand Well Supplied and Competition Becoming Sharper in Many Places

By A. E. Mockler
New York Bureau, The Oil and Gas Journal, Rooms 1919-21, No. 154 Nassau Street

NEW YORK, Mar. 3.—Reductions in export gasoline and kerosene prices and further declines in tank wagon and service station gasoline prices at numerous points in East Coast territory have featured the market during the last week. The market tone on motor fuel is definitely easy at all points. Price changes of major importance have been lacking in other refined products, but the entire position is rather soft, with the market well supplied and competition becoming sharper in many sections.

The growth of barge marketing of gasoline has been a potent factor in leading to disturbed gasoline markets in this area. Towns and cities located on deep-water and on the State barge canal in New York State have become hotbeds of competition. Jobbers in these communities are in position to buy gasoline in barge lots at prices substantially under the tank car basis, and with a further saving in transportation costs incidental to movement by water, are in advantageous position from a competitive standpoint. Marketers are keeping close watch on the situation to protect their distribution. The "edge" which barge lot buyers enjoy over their competitors is illustrated by the current wholesale market at New York harbor refineries, where tank car lots of motor fuel are quoted at 8½ cents per gallon with barge lots available at a half to three-quarters of a cent per gallon under this figure.

Tank Car Gasoline

Depression continues to rule East Coast gasoline markets at refinery terminals, and volume is along routine lines. Principal East Coast refiners are quoting U. S. Motor in tank car lots at 8½ cents per gallon, but as has been the case for months, the posted price is in many instances a nominal figure when competitive selling develops, and 8¼ cents is being freely done.

California gasoline is still an unsettling factor, although shipments have fallon off in recent weeks. California refiners are quoting 6¼ cents as their inside price for U. S. Motor in the open market, which would figure out about 8½ cents per gallon c.i.f., East Coast. Obviously, this price is not an attractive one, and it is reported that some motor fuel can be bought at 8 cents, c.i.f., North Atlantic United States ports, which figures out 5.75 cents netback. Some offerings have been reported at 7⅞ cents, c.i.f., East Coast ports, which would figure a netback much under reported current asking prices on the Pacific Coast.

To complicate the market situation, South American gasoline is moving into this country in fairly substantial volume at South Atlantic ports, and competition from this source is a potent factor in the depression of East Coast refinery markets.

Tank car movement has picked up a little during the week in response to more favorable weather conditions during part of the period, but jobbers lack confidence in the stability of the current market, and are ordering forward shipments in hand-to-mouth volume. From the standpoint of major factors competing for wholesale business, competition has never been keener in East Coast areas, and this of course has created an unsettled feeling, taken in conjunction with the unfavorable statistical position of the market at East Coast points. Current indications point to an early further downward readjustment in the tank car basis here in the event that market conditions do not show a sudden turn for the better.

Tank Wagon Gasoline

As had been expected, in view of the weak refinery market, tank wagon gasoline markets have developed irregularity, and price cutting is becoming more general. Standard of New York and other marketers reduced tank wagon and service station prices 1 cent per gallon in Greater New York, Staten Island, Long Island, Westchester and throughout Connecticut on February 26 to meet local competition. Upstate markets have seen hot competition within recent weeks, and this condition has extended throughout Vermont as well. Standard of New York and other marketers reduced their quotations 1 cent per gallon in that territory early in the week to meet the competition of independent marketers. With motor fuel at refineries available at low prices, independent marketers have been in position to cut under the established basis in many territories, and the large companies have been compelled to meet this competition.

Recent competition through price cutting in Massachusetts has created a condition where one independent marketer, operating in three counties in that State, has filed a complaint resulting in indictments being returned against 13 large companies on a charge of conspiring to destroy the business of the independent through price cutting.

Unless weather conditions should show a sudden change for the better, marketers probably will be forced to make a general downward revision in tank wagon and service station prices throughout the entire Eastern territory. The seasonal slump in consumption in this area has been much greater than refiners had looked for, and, although production has been curtailed in many instances, refinery holdings of motor fuel are still of large volume and the market tone is far from steady.

Tank wagon kerosene, which was lowered February 1, has since been free from the price cutting and weakness which characterized retail gasoline markets in most sections of the East.

Kerosene

The wholesale market has eased slightly in sympathy with the weakness in gasoline. The posted price is maintained at 7¾ cents per gallon, bulk, at refineries, but the general feeling is easier, and fractional concessions on firm business are not an improbability. The cut in export prices was also a weakening factor.

Weather conditions have made for a moderately active call for spot kerosene, and refiners report that their tank car deliveries are being well maintained for this season of the year.

Tank wagon demand for kerosene has held up fairly well, and kerosene has been unaffected by the numerous downward revisions in tank wagon gasoline which have developed at various points in the East during the last month. Since the general readjustment of kerosene prices on February 1, the market in New York State and New England has been without change.

Both bulk and cased kerosene have been moving into export channels in limited fashion in this market during the last few weeks, but the cut in prices on February 26 brought in more inquiries, and refiners look for a better March export movement.

Lubs

Cylinder stocks are showing continued weakness in the field, and this condition is being reflected in the spot market. Sellers have not revised quoted prices, but the list is subject to shading on practically all grades, and an early downward scaling of open market quotations appears inevitable.

As a result of the failure of East Coast refiners to lower their cylinder oil prices, it is reported that export buying of these oils was diverted to the Gulf market during the closing half of February.

Export movement of red and pale oils has held up well, and there has been a good demand from the domestic trade as well during the week, quotations remaining unaltered on all grades.

Fuel Oil

While the market tone is far from strong, principal refiners continue to adhere to a quotation of $1.05 per barrel, in bulk, f.o.b., refinery terminals. Contract business with the steamship companies is well maintained with heavy withdrawals reported. California fuel oil has been moved eastward in a moderate quantity since the first of the year and these added receipts have done nothing to strengthen the situation.

The Gulf market is in easy position. Sellers are quoting 70 cents per barrel, bulk, but business has been done at 2 cents under this figure, and 65 cents per barrel is now about in line with buyers' views. The cut in crude oil prices has weakened the southwestern fuel oil market, but it is believed that curtailment in crude output will offset this situation somewhat.

Heavy oil is still meeting with a good demand for delivery on furnace oil contracts, but moderate weather during the week has cut into the tank car movement of furnace oil to the jobbing trade. Prices, however, remain unchanged on all grades.

Paraffin Wax

Contrary to general expectations, the wax market has failed to hold its own, and prices are fractionally lower on several grades this week. Spot 120-122 a.m.p. is a quarter-cent lower at 3⅝ cents a pound, with 125-127 a.m.p. showing a corresponding drop at 3⅞ cents, and 133-135 a.m.p. off an eighth at 5½ cents per pound. Other melting points are unchanged.

Refinery holdings are unusually large, and buyers in many instances have withdrawn from the market in the belief that the heavy holdings, coupled with the lower market for eastern crudes, will force some downward price readjustments in the near future. Export operators have curtailed their buying activities this week.

Gas Oil

While the posted price continues maintained at 5¼ cents per barrel, this is still a nominal figure, and the bulk of the business is being put through at a quarter-cent per gallon under this figure for recycled oil at refinery terminals. On low-grade gas oil, 4¾ to 4⅞ cents is being done by some sellers.

Refiners report that contract withdrawals by the large gas manufacturing companies in the metropolitan area have shown a little improvement during the last week, weather conditions having stimulated gas consumption somewhat.

Stocks of gas oil held at Eastern refineries are fairly large, but holdings are not excessive, and there seems little selling pressure, save in a few instances on extremely low-grade stock.

Diesel Oil

Diesel oil markets are well maintained throughout East Coast territory with principal refiners continuing to quote $2 per barrel, bulk, f.o.b. refinery terminals. The bulk of the marine business is under contract, and withdrawals are being well maintained. Movement of California Diesel oil to the Atlantic Seaboard has fallen off, and East Coast markets are no longer being called upon to absorb surplus holdings of the Pacific Coast refiners. Diesel oil is available at low prices in California, but the current scarcity of tankers and consequent high charter rates combine to keep this oil off the Eastern market.

Refiners are moving current Diesel output readily into consumption, and from the standpoint of market stability and favorable returns, this oil has been virtually in a class by itself for the past year or so. Consumption has been increasing steadily from month to month, and the outlook favors further gains in the demand for this oil. A number of large Diesel-burning pleasure craft will come into service this spring, which will further increase Diesel oil sales.

Export Markets

The reduction in export gasoline and kerosene prices at the Gulf on February 26 furnished chief interest in export markets during the week. Directors of the export association met here on February 24 and it was indicated that no price change was pending. The association on February 26, however, following a polling of members, reduced its prices, 100 per cent approval of such a step having been taken. The cut was rather unexpected, coming on the heels of the reported buying of upwards of 20,000,000 gallons of gasoline in Group 3 territory by the association, and the placing of a number of cargoes at the Gulf at the old schedule of posted prices. New quotations are 8 cents per gallon on Navy, 9 cents for 60-62 400 endpoint, 9¼ cents for 61-63 390 endpoint, and 9½ cents per gallon for 64-66 gasoline. Revised prices on kerosene at the Gulf are 6 cents per gallon for prime white and 7 cents for water white.

Two cargoes were booked independently at the Gulf during the week through a London house. One cargo was for 6,000 tons of 64-66 and 2,000 tons of Navy, the second totaling 8,000 tons of Navy and 64-66, with 900 tons each of prime white and water white included in the aggregate total. Some business was reported put through by the export association at its revised schedule, but details are lacking. The two cargoes booked independently are for shipment prior to April 15 and May 15, respectively.

There was little activity in export fuel oil at the Gulf. The market was nominally held at 65 to 70 cents per barrel.

Venezuelan crude and Panuco crude were likewise quiet and inactive during the period.

Lub oils are reported to have moved into export channels in better volume at the Gulf, but East Coast markets were quiet.

California gasoline was reported available at 6 cents per gallon, f.o.b., with little trading reported, although several cargoes for shipment to Japan were reported under consideration.

Petroleum Exports

The following table shows principal exports of refined petroleum products from New York for the past three weeks (all figures in gallons unless otherwise noted):

	Week ended		
	Feb. 22	Feb. 15	Feb. 8
Gasoline	77,000	450,000	171,000
Naphtha	3,650,000	710,000	625,000
Kerosene	730,000	6,000	5,000
Fuel oil	300,000	8,000	8,000
Lubricating oil	680,000	2,615,000	1,305,000
Petroleum, refined	415,000	855,000	1,575,000
	Pounds		
Petrolatum	21,000	30,000	46,000
Paraffin wax	1,650,000	366,000	936,000
Refined	18,000	459,000	970,000
Scale	488,000	117,000	520,000
Lubricating grease	554,000	660,000	945,000

Several large export shipments of

deodorized naphtha were reported during the week, these helping to swell the total for the period. Naphtha exports from New York for the week ended February 22 were larger than aggregate export shipments from the same port for the three succeeding weeks.

Export buying of lubricating oil locally has fallen off, the recent cut in crude prices being instrumental in weakening market sentiment and leading to the belief that early price reductions were in sight. Refiners have shown no inclination to cut their prices, but buyers nevertheless are still holding off in anticipation of such action.

California Oil Receipts

Receipts of California crude and refined oils at Atlantic and Gulf Coast ports for the week ended February 22 totaled 212,000 bbls., a daily average of 30,286 bbls., against 612,000 bbls., a daily average of 87,429 bbls. for the previous week and a daily average of 61,464 bbls. for the four weeks ended February 22. Details follow:

	Bbls. of 42 gals.
At Atlantic Coast ports—	
New York	95,000
Philadelphia	117,000
Total	212,000
Daily average	30,286
At Gulf Coast ports—	
All ports	None
At Atlantic and Gulf Coast ports—	
Total	212,000
Daily average	30,286
Daily average four weeks	61,464

Distribution of total California oil receipts is as follows:

Gasoline	117,000
Fuel oil	95,000

Only one shipment of refined products was reported from California during the week, this being a cargo of 70,200 bbls. of gasoline on the Pat Doheny (Richfield) for New York.

Imports

Imports of crude and refined oils at the principal United States ports for the week ended February 22 totaled 2,294,000 bbls., a daily average of 327,714 bbls., against 2,062,000 bbls., a daily average of 294,571 bbls. for the previous week and a daily average of 256,429 bbls. for the four weeks ended February 22. Details follow:

	Bbls. of 42 gals.
At Atlantic Coast ports—	
Baltimore	263,000
Boston	123,000
New York	1,121,000
Philadelphia	358,000
Others	290,000
Total	2,155,000
Daily average	307,857
At Gulf Coast ports—	
Galveston district	64,000
New Orleans and Baton Rouge	75,000
Total	139,000
Daily average	19,857
At all United States ports—	
Total	2,294,000
Daily average	327,714
Daily average four weeks	256,429

CHICAGO FURNACE OIL HELPED BY WEATHER

(Continued from Page 234)

5 to 7½ cents on every barrel and furnish good oil.

Some refiners who saw what was coming and closed out their oil a month ago at 75 cents sold at what is pretty nearly the top of the market today to the consumer. The full specification oil does show a little more steadiness, but there is a lot of fuel oil offered while, while not full specification oil, is usuable and useful to the manufacturer who wants to reduce his operating costs. The trade here figures that with lower cost crudes there will be less fuel oil cracked and that means that there will be more fuel oil run. There are a few cases reported of industries changing from coal or fuel oil to natural gas, but few if any instances where industries have changed back from oil to coal and the demand should continue to grow.

The demand for lubricating stocks is rather light for the present and buyers continue to hold back for lower prices. So far, the market is continuing to hold, especially on bright stocks. Neutrals are seemingly in a stronger position owing to the reduced output, several hitherto large sources of supply stating that they should not run more than their own requirements and asserting that they had no stocks on hand. Steam cylinder stocks have been inquired for more freely and some prices quoted are below the prevailing market as quoted by leading refiners. The industrial demand is fair, but much competition results in local price adjustments on staple products. The demand for motor oils is quiet.

There have been no further changes in the tank wagon scale in this territory. In the East the gasoline reduction is not out of line with the prevailing figures in this section of the country, and, while there is talk of an advance of at least 1 cent when the demand is better, say along in May, the major companies have no comment to make on these reports. Any expression of advances to the refined gasoline market might make during the active season is avoided by many but the idea prevailing with many jobbers is that it will be a season of low prices and narrow margins. Yet there are reasons to expect a better situation than this could indicate. For one thing, prices are too low for the smaller refiners to run more gasoline than necessary to keep their plants in operating condition and hold their crude contracts. A little selling would place these refiners in a position where they would have no material for sale and those who did have gasoline which they could deliver would ask better prices, and the upward swing would begin with better buying on the advancing market.

OUTLINE ADVANTAGES OF GERM PROCESS

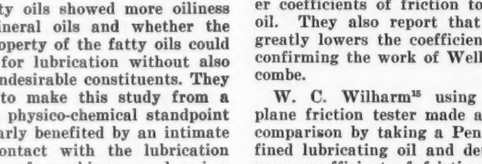
(Continued from Page 62)

with mineral oils in quantities sufficient to give the required result is prohibitive. Fatty oils in such quantities sufficient to give maximum lowering of the coefficient of friction form excess acid, cause gumming, and are generally unsatisfactory for use in boundary lubrication.

H. M. Wells, with an engineering associate, W. Scott Taggart, started some time before 1900 a study to determine why the fatty oils showed more oiliness than the mineral oils and whether the beneficial property of the fatty oils could be obtained for lubrication without also taking the undesirable constituents. They were fitted to make this study from a physical and physico-chemical standpoint and particularly benefited by an intimate and daily contact with the lubrication of all types of machinery and prime movers. Wells and Taggart in 1902 published a book entitled "Cylinder Oil and Cylinder Lubrication" which compiled the results of a tremendous amount of work, but they had not found the answer to this problem. A few years later J. E. Southcombe became associated with this work and continued the patient and extensive search. The solution to the problem was obtained in the early part of 1918, but was not published until 1920. Wells and Southcombe made application for patent in 1918, but the English government war officials forbade publication. Had the principle discovered by Wells and Southcombe been published at this time, it would have gone a long way toward alleviating the shortage of animal and vegetable oils from which the Germans and their allies were suffering. The large quantities of vegetable and animal oils that were being required for lubrication had practically exhausted the edible supply and yet sufficient quantities were not available for lubrication.

Addition of Water

It is well to recall in this connection that a fat may be converted into glycerin and fatty acid by the addition of water to the fat molecule:



Fat Water Glycerin Fatty Acid

Wells and Southcombe[17] separated the active principle of the fatty oils that gave the friction reduction without the detrimental properties. They found that the interfacial tension against water of the vegetable and animal oils is much lower than in the case of a mineral oil, also that the lowering of the interfacial tension against water in the case of fatty oils was due to their slight content of free fatty acid. By removing the free fatty acids from the saponifiable oils, the tension rises and by adding free fatty acids to the mineral oils, the tension can be lowered. Blending this active principle with mineral oil was called "Germ Process" by Wells and Southcombe because[18] "the germ is the first principle of organic life; by analogy we call a suitable acid when dissolved in mineral oil the germ which gives to mineral oil its life and activity as a more perfect 'instrument of lubrication.' "

Effect of Fatty Acid

To prove conclusively that there is a direct relation between the interfacial tension of fatty acid and water their experiments were confirmed by making measurements on a Thurston type friction testing machine. Table 1 shows the results obtained. The oils shown in the table were nearly identical in viscosity and gravity, yet the coefficient of friction of the mineral oil with the 2 per cent fatty acid is approximately 30 per cent lower than a mixture of 40 per cent mineral oil and 60 per cent olive oil. The coefficient of friction with the 40 per cent mineral-60 per cent olive oil is, no doubt, low due to the 0.9 per cent free acid it carries which would be very difficult to remove by refining and, if done, additional fatty acid is soon formed by hydrolysis. Relatively minute quantities of fatty acid suffice to lower the coefficient of friction.

Robert E. Wilson and D. P. Barnard[18] have shown that substances may lower the interfacial tension and not reduce the coefficient of friction. These experimenters used mercury and oil, and found that even though 2 per cent additions of para cresol lowered the surface tension it appeared to give slightly higher coefficients of friction to the mineral oil. They also report that stearic acid greatly lowers the coefficient of friction, confirming the work of Wells and Southcombe.

W. C. Wilharm[19] using an inclined plane friction tester made an interesting comparison by taking a Pennsylvania refined lubricating oil and determining its mean coefficient of friction, then determining the coefficient of friction of the crude oil from which the lubricating oil was obtained. The coefficient of friction of the crude oil blended with oleic acid was also obtained. Table No. 2 shows this comparison. The coefficient of friction with oleic acid in the crude oil is approximately 30 per cent lower than the coefficient of friction of the refined Pennsylvania lubricating oil. Wilharm also finds a close agreement in friction coefficients between lard oil and oleic acid which he states "is not surprising since the active principle in lard oil is oleic acid." It is interesting to note that, even though the viscosity of the crude oil and oleic acid is only one-sixth as high as the lubricating oil, the coefficient of friction of the crude oil with oleic acid is 30 per cent lower than obtained with the lubricating oil.

The National Physical Laboratory,[19] London, with the Deeley friction testing machine obtained results with an engine oil and the same oil plus 1 per cent oleic acid over a rather wide range of pressures. The chart shows the results obtained. The friction with A is approximately 23 per cent higher than B (same oil with only 1 per cent of fatty acid). This is noticeable at all pressures. Oil A is most erratic showing great susceptibility to changes in pressure. When 1 per cent fatty acid is added, there is a smooth even running at all pressures.

In these experiments 1 per cent fatty acid shows a reduction of the coefficient of friction of only 23 per cent. Archbutt,[17] using 1 per cent of rape oil fatty acid on a Thurston machine at 270 pounds per square inch at a speed of 7 feet per minute, obtained a coefficient of friction of 0.0033 while the mineral oil without the fatty acid shows 0.0047 which is again approximately 30 per cent reduction.

Thus we see that many independent investigators have found that the coefficient of friction of mineral oils may be reduced approximately 30 per cent by blending with small amounts of commercial fatty acids.

[17] J. Soc. Chem. Ind. (1920) p. 51; U. S. Patent No. 1,319,129.
[18] J.I.E.C. Vol. 14 No. 8—August 1922—p. 691.
[19] Communication H. M. Wells Oil Co., London, England.

FIRST AID TRAINING IN THE OIL INDUSTRY

By Charles E. Kern
Washington Bureau, The Oil and Gas Journal

WASHINGTON, D. C., Mar. 3.—First aid training to employes of mining and oil companies is now more extensively carried on by the Bureau of Mines than since the beginning of this work in 1911. During the three fiscal years ending July 1, 1929, there were a total of 163,118 certificates in first aid issued, or 51.5 per cent of the entire number trained by the Bureau of Mines. First aid training work has increased from 37,917, in 1927 to 45,572 in 1928 and to 79,572 in 1929.

In the petroleum industry training in first aid work shows activity in about the same proportion in each state as is shown by the production and refining industry. In California during the two and a half years ending July 1, 1929, training was given to 5,122 persons. Oklahoma received training for 5,362 employes, Texas 5,725, Illinois 2,795, Indiana 2,841, Wyoming 2,588, Pennsylvania 520, Kansas 574, Louisiana 1,151, with other states showing smaller numbers.

Since January 1, 1927, a total of 28,298 first aid training certificates have been given to employes of petroleum plants in 18 states. Since then approximately 90 petroleum plants have co-operated. During the fiscal year ending June 30, 1930, it is expected at least 15,000 first aid certificates will have been issued to the petroleum industry.

The total number of men trained in first aid work by the Bureau is 366,731.

The Bureau has a record of numerous cases showing the direct saving of life by first aid training, not only in activities of the oil industry but also in the homes of employes whose knowledge has been helpful when accidents have occurred. Letters showing the reduction of hours, loss of time incident to a reduction of accidents are on file with the Bureau. One executive states, "we have set up a record recently of 153 days without an accident resulting in any loss of time and our first aid cases have been of extremely minor importance."

Typical of numerous reports is a letter from California stating that in 1928 some 2,000 or about 65 per cent of the employes of a petroleum company were given first aid instruction and the company's annual report shows a 39.7 per cent reduction in the number of loss time accidents; 44.6 per cent reduction in the number of days loss time and 26.8 per cent reduction in compensation and medical costs.

As a result most of the compensation-insurance companies in writing risks take into consideration the extent of first aid training among the employes. In these ways there has been an actual saving of money by this humanitarian effort to ameliorate conditions of hazardous employment.

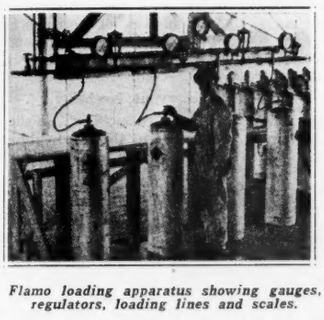
Natural Gasoline Manufacture

Standard Company Widens Market for Specialty Product

The Standard Gasoline Co. of California is steadily increasing the output of its liquefied gas which is manufactured in the Huntington Beach Field. The gas, which bears the trade name of "Standard Flamo," is sold under the direction of the specialty department of the Standard Oil Co. of California of which the Standard Gasoline Co. is a subsidiary.

The Standard Gasoline Co. after considerable experimental work started to manufacture the special product last year on a commercial basis. As in other parts of the country the product is sold as a domestic fuel. With the proper equipment the propane and butane series are fractionated out of the regular grades of natural gasoline. These hydrocarbons are then compressed in cylinders and sold to consumers for use as fuel in stoves and other heating equipment.

The experience of the Standard company in the West Coast states has been similar to that of Mid-Continent com-



Flamo loading apparatus showing gauges, regulators, loading lines and scales.

panies who are manufacturing the liquefied gases and selling them in rural sections, small towns and other points not served with natural or artificial gas distributing systems. The consumer demand has increased rapidly and the company anticipates a substantial gain during the coming year.

In the current issue of the Booster published by the Standard Gasoline Co. the following explanation of the method of handling the product is given:

"The refined Flamo is drawn off from the rectifier and stored in pressure tanks, where it is pumped as needed to a filling rack. Steel cylinders are provided for the transportation of Flamo and these cylinders are filled at the rack, this operation being performed under strict rules of the Bureau of Explosives. Light petroleum products have appreciable expansion factors and great caution is taken to see that sufficient room in the cylinder is left for expansion due to possible temperature rise in accordance with Bureau of Explosives' requirements.

"Cylinders are filled on scales and automatic equipment is used to shut off the flow of Flamo in order that the cylinder may not be overfilled. They are then carefully inspected and tested for possible defects and, if any are found, the cylinder is rejected for loading and repairs made.

"Standard Flamo is naturally odorless and as a means of detecting leaks in household piping an artificial odorant is added in very small quantities during the process of manufacture. This odorant readily evaporates with the Flamo upon reduction in pressure.

Distribution

"The distribution and sale of Flamo is handled by the specialty department of the Standard Oil Co., which has created

(Continued on Page 250)

Construction and Operation

OPERATING SUPERINTENDENT*

It is uneconomic to maintain a complete staff of technical men and experts at every natural gasoline plant. In this business, as in others where a number of plants are operated by one unit, it is more expedient to concentrate technical talent at general headquarters and to make the same talent available to every plant or factory in the unit. In a gasoline department the research staff and operating superintendent represent the expert talent. The plant superintendent and control man are supposed to be qualified to operate a plant under given conditions. They are not expected to change those conditions or to deviate from accepted operating rules. Their chief functions are to maintain machinery and equipment, to operate all of the complicated absorption, distillation, and rectification processes along predetermined lines, to manufacture a specified grade of gasoline, and to do all this at the lowest possible cost.

One of the most important responsibilities of the operating superintendent is to develop and maintain the best possible calibered plant superintendents and control men in all of his plants. If he is successful in this task, a major portion of his "grief" is behind him. In such a situation the operating superintendent becomes an inspector for the general office so that that office may know that all of the plants are operating "first rate."

However, it is not always possible to obtain such an ideal condition. Some plants are too small to justify the employment of the same class of superintendent that is called for by a large plant. Possibly the small unit cannot support a control man (sometimes referred to as chemist). These plants, therefore, are apt to need more of the personal assistance of the operating superintendent. In a growing organization, men here and there are promoted, a plant superintendent is moved, and a control man elevated, with the result that the mobile operating superintendent finds he can use a good deal of his time to advantage in assisting the staff at these plants.

It was not so long ago that the operating superintendent did most of the efficiency checking. Today, this is not general practice except in smaller units. This part of the work is now done by the research staff. A technician comes to a plant either periodically or when "trouble" justifies it, takes samples of gas, gasoline, etc., temperatures, oil circulation, etc., and makes a material balance, and, if necessary, an equipment balance to determine whether the plant is operating at the required efficiency, and, if not, what part of the equipment is responsible for the deficiency.

With such a scheme in vogue, the operating superintendent can devote the greater part of his time to observing the physical operations and to determine whether the processing is being done according to instructions laid down for the particular plant. He inspects the machinery, the boilers, and the pipe line system. He observes the treating of gasoline and water, and the handling of gasoline in the plant and at the loading rack.

Nothing is more important in plant operation than that the product be held safely within specifications. Eternal vigilance on the part of the operating superintendent is imperative in this direction. The superintendent and control man in the laboratory must be continually impressed with the importance of making an A-1 product all the time. He will not tolerate the notion that it is all right to "boiler-house" a distillation or to let a car "get by" which is **almost** within the specifications laid down by the office.

The operating superintendent is the buffer between office and plant. He gets a part of the credit when a plant makes a fine showing. When all is "bottom-side up," as plants do get now and then, most of the "grief" is passed to him. After all is said and done, the best engineered plant in the richest gas field is only as profitable as it is maintained by the operators. Under the general guidance of the itinerant superintendent, all of the available gas that can be handled by the machinery must be brought into the plant, must be efficiently processed, and the best grade of gasoline produced at the lowest possible cost. Second only to these functions comes the continued maintenance of equipment and machinery in the best possible state of repair.

These are the tasks which test the skill and patience of the operating superintendent when he comes to a plant. And when these tasks are done, all he has to do is to go on to the next plant—many chores await him there.

*Second of a series of articles explaining the inner workings of a natural gasoline organization. The series were prepared by a manufacturer thoroughly familiar with all phases of construction and operation.

Who's Who
IN NATURAL GASOLINE MANUFACTURE

THE LONE STAR GAS CO.

The Lone Star Gas Co., a subsidiary of the Lone Star Gas Corp. of Pittsburgh, with its affiliated companies is primarily engaged in the production and distribution of natural gas centering in North and Central Texas.

In connection with its operations the company has developed both crude oil and gas producing properties in Texas and Oklahoma. Some of the so-called dry gas wells have had sufficient gasoline in the gas to warrant the construction of plants and this has been done at several Texas points with one plant in Oklahoma. The company's plant at Petrolia, in Clay County, Texas, operated in connection with a gas gathering system is one of the oldest plants in North Texas, having been built in 1916. A recent check showed that the plant had produced over 35,000,000 gallons of natural gasoline.

Some of the company's 11 plants operate with gas from dry gas lines before the gas is delivered to distributing companies in cities and towns of the section of Texas in which it operates.

The main operating office of the company is located in Dallas. J. R. Jarvis is general superintendent of the gasoline plants. F. L. Chase, vice president, has general charge of sales. Through a contract agreement the Warren Petroleum Co. is now buying the output of all plants.

Following is a list of the company's plants:

Location—	Daily plant cap.
Clay County, Texas	15,000
Cooke County, Texas	15,000
Palo Pinto County, Texas	15,000
Palo Pinto County, Texas	35,000
Eastland County, Texas	2,000
Harmon County, Oklahoma	12,000
Stephens County, Texas	2,000
Eastland County, Texas	4,000
Eastland County, Texas	10,000
Comanche County, Texas	2,000
Total	112,000

BUILD GASOLINE PLANT COLEMAN COUNTY, TEXAS

The Texas American Syndicate of Dallas is erecting a one-unit well pressure absorption type casinghead gasoline plant to be located on the Nannie Newton farm in the San Augustine Survey in Coleman County, Texas. It will have a capacity of 10,000,000 feet of gas daily at 300 pounds pressure.

The gas is under a rock pressure of 1,400 pounds and yields 5 gallons of gasoline per 1,000 feet. The gasoline will be shipped in tank cars from a loading rack on the P. & N. T. R. R. The plant will be operating in about 30 days. The company has leases or owns in fee 14,300 acres centering around the Newton farm. The Oklahoma Natural Gas Co. will continue to take the residue.

LARGE CLASS RECEIVES PRACTICAL TRAINING

Approximately 47 per cent of the men on the pay roll of the Standard Gasoline Co. of California received at least one course of study under company instructors intended to improve their knowledge of plant operations during 1929. These courses were instituted several years ago and the interest in them has consistently grown.

As an example of the work and the number enrolled, there were 242 who took the physics course, and 150 received instructions in shop arithmetic, pump design and steam power plant practices. The enrollment showed that 78 per cent signing for the course, completed the work which in itself shows the popularity of the school.

During 1929 there were 431 men who recieved these instructions and a still larger class for the spring period is expected.

GAS CONSOLIDATION REPORTED UNDER WAY

NEW YORK, Mar. 3.—Natural gas properties of Magnolia Petroleum Co., United Gas Co. and the Louisiana Gas & Fuel Co. will be consolidated into the largest natural gas unit in the world, according to reports in financial circles.

United Gas Co., a Moody-Seagraves unit, has optioned the natural gas properties of the Magnolia Petroleum Co. Louisiana Gas & Fuel Co., natural gas subsidiary of the Electric Light & Power Corp., owns the Palmer Corp., one of the largest natural gas companies in Louisiania, outright.

BUILDING SOUTH OF SEMINOLE

Crosbie & Moran, Inc., are building a 20,000-gallon natural gasoline plant in Section 8-6-6, south of Seminole, Okla., in the Konowa Pool. Construction work is expected to be completed early in April, Tulsa type equipment being used for the general processing.

The company is operating three other plants, two of which are in the Earlsboro Pool of the Seminole area. The other is in Logan County, Oklahoma.

Brief Items for Petroleum Refiners

Chairman H. M. Dawes Appoints Committees On Marketing Code

NEW YORK, Mar. 1.—Appointment of committees on the petroleum industry's marketing code has been announced by Henry M. Dawes, the Pure Oil Co., Chicago, chairman of the general committee of the American Petroleum Institute's Division of Marketing.

Roy B. Jones, Panhandle Producing & Refining Co., Wichita Falls, Tex., is chairman of the committee on a national code of practices for marketing refined petroleum products. This committee will consider proposals to revise the code and make recommendations to the general committee of the Division of Marketing.

Members are: U. deB. Daly, Shell Petroleum Corp., St. Louis, Mo.; R. C. Holmes, The Texas Company, New York; W. M. Irish, Atlantic Refining Co., Philadelphia; K. R. Kingsbury, Standard Oil Co. of California, San Francisco; P. M. Miskell, Empire Oil & Refining Co., Tulsa, Okla.; J. Howard Pew, Sun Oil Co., Philadelphia; E. G. Seubert, Standard Oil Co. of Indiana, and E. T. Wilson, Continental Oil Co., Denver, Colo.

The chairman of the committee for the Pacific Coast region, which includes Washington, Oregon, California, Nevada, Arizona and Territories of Hawaii and Alaska, is H. D. Collier, Standard Oil Co. of California, San Francisco. The secretary is R. W. Martin, Union Oil Building, Los Angeles, Calif. F. C. Cramer, Denver Powerine Co., Denver, Colo., is chairman of the committee for the Rocky Mountain region, which includes Montana, Idaho, Wyoming, Utah, Colorado and New Mexico.

The committee of the Southwestern region (Texas, Arkansas and Louisiana) also is headed by Roy B. Jones, while P. M. Miskell is chairman of the committee for the Mid-Continent region (Oklahoma and Kansas).

The Middle Western region is made up of Ohio, Wisconsin, Indiana, Minnesota, Michigan, North Dakota, South Dakota, Illinois, Missouri, Nebraska and Iowa.

(Continued on Page 250)

NEW REFINERY IN DALLAS

The Texas Eagleford Oil & Refining Co. recently completed building a 1,000-bbl. refinery in West Dallas, Tex., and is now operating the plant on tops shipped by rail from West Texas points. The products are sold locally and a large portion of the gasoline production is distributed through the 12 local service stations of the Everybodys Oil & Gas Co. at Dallas.

A portion of the equipment was previously part of a refinery at Greenville, Tex., which was dismantled and moved to Dallas. Dan Robinwitz is president of the new company, Robert Knight, vice president and general manager, and J. K. Whitehead is secretary and treasurer.

TO RESUME OPERATIONS

FORT WORTH, Tex., Mar. 1.—The Amarillo Producers & Refiners Corp. has completed minor repairs at its Pyote, West Texas, refinery and will resume its operation within the next week. The plant was shut down in August. The company recently closed a contract for the delivery of 2,000 bbls. of crude per day for a year and the refinery runs will be maintained at approximately this rate. Other refineries of the company are located at Del Rio, Tex., operating as the Del Rio Refining Co., and the Michigan Central Refining Co. at Muskegon, Mich.

NEW YORK PRICE CUT TO MEET COMPETITION

NEW YORK, Mar. 1.—Standard Oil Co. of New York, which revised its marketing policy February 1 in an effort to stabilize markets in its territory, is confronted with a price war in metropolitan New York and surrounding territory. Municipal Service Corp. and its holding company, Warner-Quinlan Co., have been consistently underselling Socony. Municipal operates the largest chain of filling stations in New York City.

Standard of New York, effective February 26, cut tank wagon and service station gasoline in Greater New York 1 cent, bringing its posted price down to 14.3 cents tank wagon and 16.3 cents service station, both including tax. This met the prevailing schedule of Warner-Quinlan and Municipal. The latter two companies, however, have now reduced their prices 1 cent, restoring the old 1-cent differential between their quotations and Socony's. Other companies have been forced to meet the Socony cut, and a few independents have met the Warner-Quinland and Municipal basis.

WILL AID FAMILIES OF VICTIMS IN PLANT FIRE

NEW YORK, Mar. 1.—Standard Oil Co. of New Jersey, through Charles G. Black, vice president, has mailed checks for $5,000 each to the St. Elizabeth, Alexian Brothers and Elizabeth General Hospitals of Elizabeth, N. J., which have been caring for many of the employes of the company injured in the recent Bayway refinery explosion. In a letter accompanying the checks, Mr. Black praised the hospitals for their "wholehearted and spontaneous response in an emergency" and made it clear that the company intended the checks as gifts and that the sum was not to be included as payment for usual charges.

The New Jersey company has announced that all funeral expenses of employes killed in the blast will be paid by the company, that all hospital charges would be met, and that all injured would receive full wages pending their recovery.

Standard of New Jersey will distribute approximately $250,000 among the families of the victims. The requirements of the New Jersey State Compensation Law will be exceeded in all instances.

DOUBLE REFRIGERATING PLANT

The Texas Pacific Coal & Oil Co. is doubling the capacity of the refrigerating plant for the manufacture of low cold test bright stocks and motor oils at its Fort Worth, Texas, refinery. The company has developed a unique method of applying direct expansion for the cooling of the wax-oil solution and considerable research work is now in progress for the careful study of the operating advantages of wax free lubricating oils.

The company is operating a 3,500-bbl. topping plant at Wynnewood, Okla., a 3,000-bbl. topping and lub plant at Fort Worth, a 1,000-bbl. combination topping plant and gasoline plant at Caddo, Texas, and recently purchased a refinery site at Lubbuck, Tex., for the future expansion of its refining activities.

COUSINO WITH SECURITY

CHICAGO, Mar. 3.—Edward A. Cousino for 11 years manager of the fuel oil department of the Acme Petroleum Co., of this city, has resigned. He will shortly open an office here for the Security Petroleum Corp. of Kansas City.

CHICAGO POST OFFICE BIDS LITTLE CHANGED

CHICAGO, Feb. 28.—The bids received by the Chicago post office to supply the gasoline for the second quarter of 1930 showed little change in the market or any anticipation of a decided advance during the quarter beginning April 1. Bids were received in three forms, one being for tank car deliveries at a flat rate over each month, the second a differential bid based on the tank car market, date of shipment delivery in both cases to be to the sellers' local storage. The third form was for tank wagon delivery.

The Jewett & Sowers Oil Co., who are the present holders of the contract bid on the monthly flat tank car price, 6 cents, Group 3, for April, 6¼ cents for May and 6½ cents for June. On the differential bid they made an offer of an eighth-cent above the tank car market price as regularly determined at the date of shipment.

The Wells Petroleum Co. did not make a flat bid but offered a price of an eighth-cent below the tank car market date of shipment. The Service Oil Co.'s only bid was on the differential proposition, it bidding the tank car market with a maximum of 7½ cents. The Seneca Petroleum Co. bid a flat rate of 6½ cents for the first, 6¾ cents for the second and 7 cents for the third month or an eighth-cent below the tank car market with a maximum of .0722 cents. The Apex Motor Fuel Co. bid 6¼ cents for the three-month term or the minimum tank car market date of shipment with a maximum of 6¼ cents. The Continental Oil Co. made an offer to furnish the gasoline at the average tank car market date of shipment with no maximum. North American Oil Corp. made no flat price for the months but bid the low price published Monday

(Continued on Page 250)

TO DISTRIBUTE IN CLEVELAND

NEW YORK, Mar. 3.—The Sun Oil Co. has announced plans for establishing a distributing center at Cleveland, Ohio, and will expend approximately $5,500,000 in that city and the surrounding section. The company will erect a large bulk storage plant on a site recently purchased along the Cuyahoga River. The company has a refinery at Toledo, Ohio, and it is understood that the products will be brought to Cleveland by water.

ARRO INCREASES SCHEDULE

The Arro Oil & Refining Co. will increase the operating schedule of its Lewistown, Mont., plant on April 1. For the past months it has been operating for 10 days each month and was shut down over the balance of the time. After April 1, the company will run continuously. The plant has a capacity of 2,000 bbls. daily.

NEW FILTERS FOR OIL CREEK

TITUSVILLE, Pa., Mar. 1.—New filters being added to the Oil Creek Refining Co.'s refinery here will double the filtering capacity of the lubricating oil plant. The refinery has a crude capacity of 1,200 bbls. daily and finishes a large portion of this into neutrals and bright stock.

INCREASES CRACKING CAPACITY

LAREDO, Tex., Mar. 1.—The Motor Fuel Products Co. is adding 1,000 bbls. cracking capacity to its refinery here. At present it is operating a Jenkins cracking unit making the total ultimate cracking capacity 2,500 bbls. per day.

Humble Plants Show Large Increases in Refining Capacities

During the past year the Humble Oil & Refining Co. has added 33,500 bbls. crude capacity to its refineries and 50,000 bbls. cracking capacity expressed as daily throughput. The greater portion of this expansion program was carried out in the Baytown, Tex., refinery, the capacity of the plant at present being 125,000 bbls. and equal to any in this respect.

Approximately 25,000 bbls. crude capacity was added to the Baytown plant during the year and 33,000 bbls. of cracking capacity. Special equipment was added as a portion of this total for the increased production of motor oils and bright stock. Considerable attention is being given to the manufacture of low cold test lubricating oils and aside from the fact the plant has expanded greatly with respect to running more crude, the enlargement of its lubricating plant has been even more pronounced. Mid-Continent mixed base crudes are being run in producing the low cold test lubricants and upon the completion of refrigerating equipment and dewaxing equipment now well under construction, the output will be greatly increased.

New Refinery at Neches

A new refinery at Neches, Tex., on the Gulf Coast was added to the group during the year bringing the total number of plants to seven. This plant has a daily capacity of 5,000 bbls. The enlargement of the Chilton, Tex., refinery from 1,500 bbls. capacity a year ago to 4,500 bbls. at present accounts for the balance of the total increase shown for the group. The other plants, namely the 15,000-bbl. plant at Ingleside, the 15,000-bbl. plant at McCamey, the 4,000-bbl. plant at San Antonio and the 1,500-bbl. plant at Breckenridge showed no change in their rated crude capacity. The Baytown refinery has been developed principally for the quantity production of standard petroleum products and the great bulk of the output goes for export and to the Eastern Seaboard.

The other plants have been located at points where a large percentage of their production may be distributed locally through the company's stations and through jobbers. The company is carrying on a program of expanding the outlet for its products throughout Texas and is establishing superstations in many of the larger towns.

ILLINOIS MARKETERS IN SESSION AT PEORIA

CHICAGO, Mar. 1.—The Illinois Petroleum Marketers Association held a successful meeting at Peoria this week. C. P. Poland of the Poland Oil Co., Hillsboro, was elected president, and George Prescott of the Prescott Oil Co., Dixon, vice president. G. A. Primm, the successful secretary of the organization, was re-elected without opposition. Seven directors were elected to fill the positions of those whose terms expired. They were J. W. Hart, Hart Oil Co., Rockford; C. Larson, Orient Oil Co., Elgin; F. E. Morrison, Home Oil Co., Marion; William Breitweiser, New Era Oil Co., Bellville; E. P. Smith, Madison County Oil Co., Edwardsville; Harvey Richardson, Home Oil Co., Quincy, and S. A. Muench, Diamond Gasoline Co., Carlinville. There was some buying by the oil jobbers at the meeting but it was chiefly for present needs and not for storage for future requirements.

Griscom-Russell

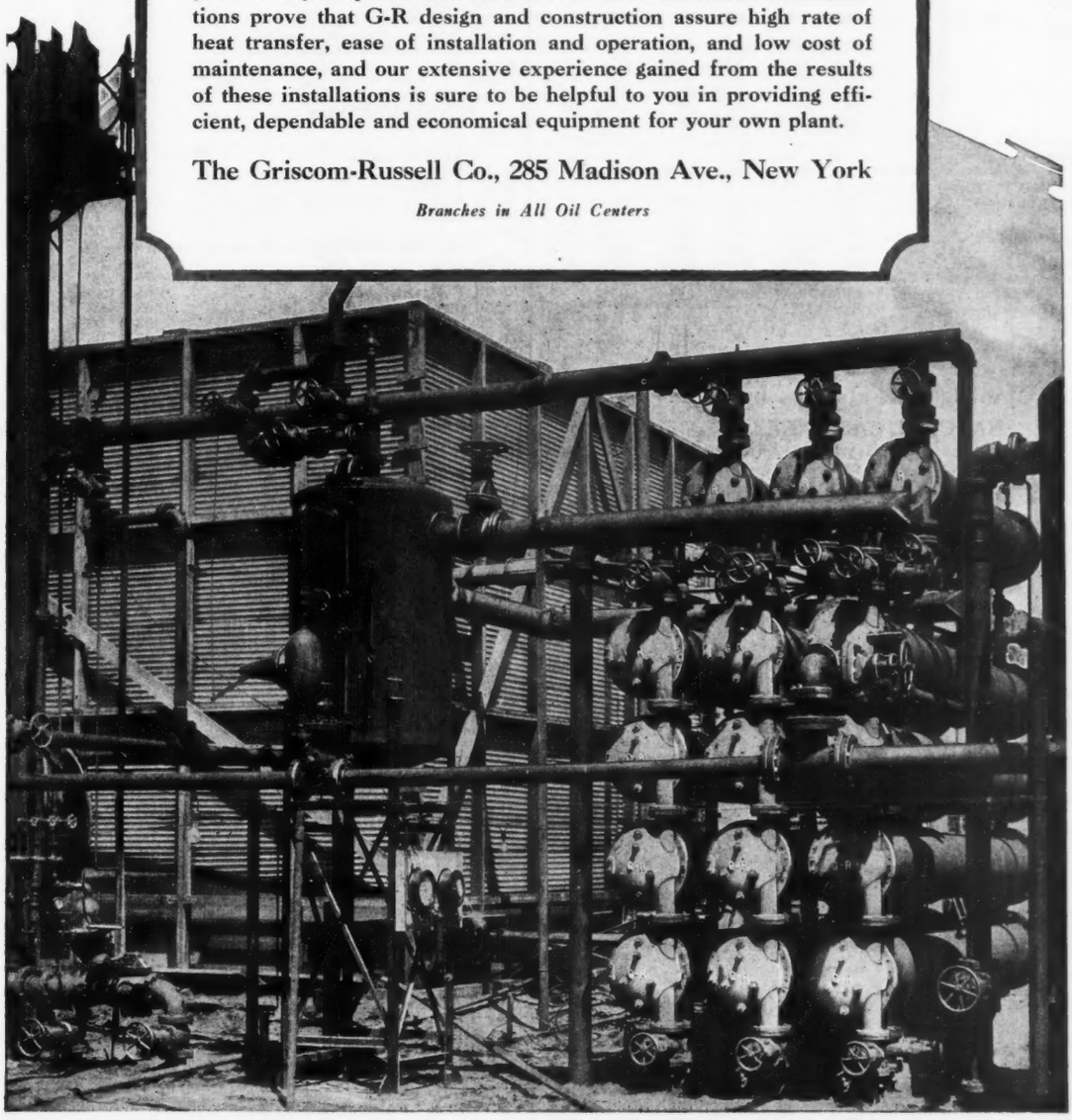
Heat Transfer Apparatus

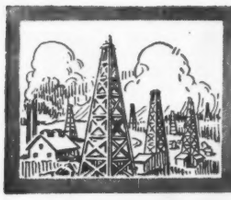
SUBCOOLING and partial condensers, heat exchangers, coolers and preheaters for all fluids and for all temperature, pressure and capacity requirements, are included among the many types of G-R Apparatus for refineries and natural gasoline plants.

There is an exactly suitable G-R Unit for every heat transfer process in your plant. The service records of thousands of installations prove that G-R design and construction assure high rate of heat transfer, ease of installation and operation, and low cost of maintenance, and our extensive experience gained from the results of these installations is sure to be helpful to you in providing efficient, dependable and economical equipment for your own plant.

The Griscom-Russell Co., 285 Madison Ave., New York

Branches in All Oil Centers





REFINERY AND CRUDE PRICES

Quotations on refined products are for interstate or export movement unless otherwise noted.

GASOLINE AND NAPHTHA

OKLAHOMA (Group 3)—	Mar. 4		Feb. 25		Feb. 18	
50-52 450 endpoint	.06¼		.06¼		.06¼	
56-58 450 endpoint	.05¾	.06	.05¾	.06	.05¾	.06
*58-60 437 endpoint (U. S. Motor)	.065		.065		.0652	
*60-62 437 endpoint	†.06¼	.06½	†.06¼	.06½	.065	
*60-62 400 endpoint	.0675		.0675		.0675	
*64-66 375 endpoint	.075		.0775		.0775	
68-70 360 endpoint	.07½	.08	.07½	.08	.07½	.08
64-66 437 endpoint (blend)	.05¾	.06¼	.05¾	.06¼	.06	.06½
NORTH TEXAS—						
56-58 450 endpoint	.05¾	.06	.05¾	.06	.05¾	.06
58-60 450 endpoint	.05½	.05¾	.05½	.05¾	.05¾	
58-60 437 endpoint (U. S. Motor)	.05⅝	.06	.05¾	.06¼	.05¾	.06¼
60-62 400 endpoint	.06	.06¼	.06⅛	.06¼	.06⅛	.06¼
64-66 390 endpoint	.06½	.06¾	.06⅝	.07	.06⅝	.07
64-66 375 endpoint	.07	.07¼	.07	.07¼	.07⅛	.07½
68-70 360 endpoint	.07½	.07¾	.07½	.07¾	.07½	.07¾
64-66 437 endpoint (blend)	.05¾	.06	.06	.06¼	.06	.06½
***NORTH LOUISIANA—**						
58-60 437 endpoint (U. S. Motor)	.06¾		.06¾		.06¾	
***ARKANSAS—**						
58-60 437 endpoint (U. S. Motor)	.06¾		.06¾		.06¾	
PENNSYLVANIA—						
52-54 Naphtha	.07¼	.07½	.07	.07¼	.07	.07¼
54-56 Naphtha	.07¼	.07½	.07¼	.07½	.07	.07¼
58-60 Gasoline	.07¾	.08	.07½	.07¾	.07½	.07¾
60 Gasoline	.08	.08¼	.07¾	.08	.07¾	.08
62 Gasoline	.08	.08¼	.07¾	.08	.07¾	.08
64 Gasoline	.08½		.08¼	.08½	.08	.08¼
68-70 350 endpoint gasoline	.09½		.09¼	.09½	.09¼	.09½
CALIFORNIA—						
58-60 437 endpoint (U. S. Motor) domestic	.09	.10	.09	.10	.09	.10
CHICAGO DISTRICT (Based on Group 3)—						
50-52 450 endpoint (Naphtha)	.06¼		.06	.06¼	.06¼	
56-58 450 endpoint	.05¾	.06	.05¾	.06	.05¾	.06
58-60 437 endpoint (U. S. Motor)	.05¾	.06½	.05¾	.06½	.05¾	.06½
60-62 400 endpoint	.06	.06¾	.06¼	.06½	.06¼	.06½
64-66 375 endpoint	.07	.07⅜	.07¼	.07½	.07¼	.07½
68-70 360 endpoint	.07½	.07¾	.07⅝	.07⅞	.07¾	.08
64-66 437 endpoint (blend)	.06¼	.06½	.06¼		.06¼	
GULF COAST (Export)—						
58-60 (U. S. Motor)	.08		.08½		.08½	
60-62 400 endpoint	.09		.09½		.09½	
61-63 390 endpoint	.09¼		.09¾		.09¾	
64-66 375 endpoint	.09		.10		.10	

*Louisiana, Arkansas, Mississippi and East Texas delivery.

NATURAL GASOLINE

OKLAHOMA (Group 3)—	Mar. 4		Feb. 25		Feb. 18	
Grade A, 72-79.9, 375 e.p., rec. 90%	.05½	.05⅝	.05½	.05⅝	.05½	.05⅝
Grade AA, 80-87.9, 375 e.p., rec. 90%	.05⅜	.05½	.05⅜	.05½	.05¼	
Grade B, 76-83.9, 375 e.p., rec. 85%	.04½	.04⅝	.04⅝	.04¾	.04½	
†Grade BB, 84-92, 375 e.p., rec. 85%	.04⅜	.04½	.04½		.04¼	
Grade C, 80-92, 375 e.p., rec. 78%	.04⅜		.04½		.04⅛	.04¼
NORTH TEXAS—						
Grade A, 72-79.9, 375 e.p., rec. 90%	.05½	.05⅝	.05½	.05⅝	.05½	.05¾
Grade AA, 80-87.9, 375 e.p., rec. 90%	.05⅜	.05½	.05⅜	.05½	.05¼	
Grade B, 76-83.9, 375 e.p., rec. 85%	.04½	.04⅝	.04⅝	.04¾	.04½	
Grade BB, 84-92, 375 e.p., rec. 85%	.04⅜	.04½	.04½		.04¼	
Grade C, 80-92, 375 e.p., rec. 78%	.04⅜		.04½		.04⅛	.04¼
NORTH LOUISIANA—						
Grade AA, 80-87, 375 e.p., rec. 90%	.05¾		.05¾		.05½	.05¾
Grade BB, 84-92, 375 e.p., rec. 85%	.04¾	.05	.04¾	.05	.04½	.04¾
Grade C, 80-92, 375 e.p., rec. 78%	.04¾		.04¾		.04¼	.04½
CALIFORNIA—						
75-78 375-390 endpoint	.08½	.09	.08½	.09	.08½	.09
CHICAGO DISTRICT (Based on Group 3)—						
Grade A, 72-79.9, 375 e.p., rec. 90%	.05⅝		.05½	.05⅝	.05⅝	
Grade AA, 80-87.9, 375 e.p., rec. 90%	.05⅜	.05½	.05⅜	.05½	.05¼	
Grade B, 76-83.9, 375 e.p., rec. 85%	.04⅝		.04½		.04½	
Grade BB, 84-92, 375 e.p., rec. 85%	.04⅜	.04½	.04½		.04¼	
Grade C, 80-92, 375 e.p., rec. 78%	.04⅜		.04½		.04⅛	

†Correct February prices on grade BB natural gasoline: Feb. 4, .04-.04⅛; Feb. 11, .04¼; Feb. 18, .04¼ and Feb. 25, .04½.

BURNING OIL

OKLAHOMA (Group 3)—	Mar. 4		Feb. 25		Feb. 18	
41-43 water white kerosene	.04¼	.04⅜	.04⅛	.04⅜	.04⅛	.04⅜
41-44 water white kerosene	.04⅜	.04½	.04⅜	.04½	.04⅜	.04½
NORTH TEXAS—						
41-43 water white kerosene	.04	.04⅛	.04	.04⅛	.04	
40-42 water white kerosene	.04		.04		.03⅞	.04
***NORTH LOUISIANA—**						
41-43 water white kerosene	.05	.05⅛	.05	.05⅛	.05	
***ARKANSAS—**						
41-43 water white kerosene	.05	.05⅛	.05	.05⅛	.05	
PENNSYLVANIA—						
43 Kerosene prime white	.05¾		.05½	.05¾	.05½	.05¾
45 Kerosene water white	.06		.05¾	.06	.05¾	.06
46 Kerosene water white	.06¼	.06½	.06	.06¼	.06	.06¼
47 Kerosene water white	.06½	.06¾	.06¼	.06½	.06¼	.06½
300 Mineral Seal	.07¼		.07	.07¼	.07	.07¼
CALIFORNIA—						
38-40 water white Kero. (high burning test)	.05	.05½	.05	.05½	.05	.05½
Engine distillate, 43-44, 445 endpoint	.07	.07½	.07	.07½	.07	.07½
Engine distillate, 42-44, 480 endpoint	.06¾	.07¼	.06¾	.07¼	.06¾	.07¼
CHICAGO DISTRICT (Based on Group 3)—						
41-43 water white kerosene	.04¼	.04⅜	.04⅛	.04⅜	.04	.04¼
42-44 water white kerosene	.04¼	.04¾	.04¼	.04¾	.04¼	.04¾
GULF COAST (Export)—						
41-43 prime white	.06		.07		.07	
41-43 water white	.07		.08		.08	

*Louisiana, Arkansas, Mississippi and East Texas delivery.

FUEL OIL

OKLAHOMA (Group 3)—	Mar. 4		Feb. 25		Feb. 18	
Below 18 Fuel Oil, per bbl.	.70	.75	.70	.75	.70	.80
18-22 Fuel Oil, per bbl.	.75	.80	.75	.80	.75	.85
20-22 Fuel Oil, per bbl.	.75	.85	.75	.85	.80	.85
22-26 Fuel Oil, per bbl.	.80	.85	.80	.85	.82½	.87½
24-26 Fuel Oil, per bbl.	.80	.90	.80	.90	.90	.95
26-30 Fuel Oil, per bbl.	.85	.90	.85	.95	.95	1.00
28-30 Fuel Oil, per bbl. (industrial)	1.05	1.10	1.05	1.10	1.05	1.10
32-36 Gas Oil (industrial)	.02½	.02¾	.02½	.02¾	.02⅝	.02⅞
32-36 Gas Oil (straw color)	.02⅞	.03⅛	.02⅞	.03⅛	.03	.03⅛
36-38 Distillate	.03	.03¼	.03	.03¼	.03¼	.03⅜
38-40 Straw Distillate	.03⅛	.03½	.03⅛	.03½	.03⅜	.03¾
NORTH TEXAS—						
Below 20 Fuel Oil, per bbl.	.60	.65	.60	.65	.60	.65
24-26 Fuel Oil, per bbl.	.80	.90	.80	.90	.80	.90
32-36 Gas Oil (straw)	.02⅜	.02⅝	.02½	.02¾	.02½	.02¾
38-40 Straw Distillate	.02⅞	.03⅛	.03	.03⅛	.03⅛	.03¼
***NORTH LOUISIANA—**						
18-20 Fuel Oil, per bbl.	.85	.90	.85	.90	.85	.90
30-32 Gas Oil	.03	.03⅛	.03	.03⅛	.03	.03¼
***ARKANSAS—**						
33-36 Distillate	.03	.03¼	.03⅛	.03¼	.03¼	.03¾
30-32 Gas Oil	.02⅞	.03⅛	.03	.03⅛	.03	.03¼
16-22 Refinery Fuel Oil, per bbl.	.85	.90	.85	.90	.85	.90
GULF COAST (South Texas)—						
Gas Oil	.03¾	.04	.03¾	.04	.03¾	.04
Bunker C Fuel (cargo lots), per bbl.	.65	.70	.65	.70	.65	.70
Bunker C. Fuel (small lots)	.95	1.00	.95	1.00	.95	1.00
PENNSYLVANIA—						
30-34 Fuel Oil	.04¾		.04½	.04¾	.04½	.04¾
36-40 Fuel Oil	.04¾	.05	.04¾		.04¾	
CALIFORNIA—						
33-36 Distillate	.03½	.04	.03½	.04	.03½	.04
26-32 Distillate	.02	.02½	.02	.02½	.02	.02½
15-20 Fuel Oil, Bunker (at tidewater)	.70	.80	.70	.80	.70	.80
15-20 Fuel Oil (cargo lots), per bbl.	.60	.75	.60	.75	.60	.75
27 plus Diesel, per bbl.	.90	1.05	.90	1.05	.90	1.05
CHICAGO DISTRICT (Based on Group 3)—						
22-26 Fuel Oil, per bbl.	.82½	.87½	.85	.90	.90	.95
18-22 Fuel Oil, per bbl.	.70	.80	.75	.80	.80	.85
28-30 Fuel Oil, per bbl.	1.05	1.15	1.07½	1.12½	1.10	1.15
32-36 Gas Oil (zero)	.03	.03¼	.02⅞	.03¼	.03⅛	.03¼
32-36 Gas Oil (industrial)	.02½	.02⅝	.02½	.02⅝	.02½	.02¾
36-38 Distillate	.03	.03¼	.03	.03⅛	.03	.03¼
38-40 Straw Distillate	.03⅛	.03⅜	.03¼	.03⅜	.03¼	.03½

*Louisiana, Arkansas, Mississippi and East Texas delivery.

LUBRICATING OIL AND WAX

OKLAHOMA (Group 3)—	Mar. 4		Feb. 25		Feb. 18	
100 vis., 2 color, 20-25 cold test	.06¾	.07	.06¾	.07	.06¾	.07
100 vis., 3 color, 20-25 cold test	.05¾	.06	.05¾	.06	.05¾	.06
150 vis., 3 color, 20-25 cold test	.08¼	.08½	.08¼	.08½	.08¼	.08½
150 vis., 4 color, 20-25 cold test	.07¾	.08	.07¾	.08	.07¾	.08
180 vis., 3 color, 23-28 cold test	.09¾	.10	.09¾	.10	.09¾	.10
180 vis., 4 color, 23-28 cold test	.09¼	.09½	.09¼	.09½	.09¼	.09½
180 vis., 5 color, 23-28 cold test	.09	.09¼	.09	.09¼	.09	.09¼
200 vis., 3 color, 23-28 cold test	.10¾	.11	.10¾	.11	.10¾	.11
200 vis., 4 color, 23-28 cold test	.10¼	.10½	.10¼	.10½	.10¼	.10½
200 vis., 5 color, 23-28 cold test	.09¾	.10	.09¾	.10	.09¾	.10
240 vis., 3 color, 25-30 cold test	.14¼	.14½	.14¼	.14½	.14¼	.14½
240 vis., 4 color, 25-30 cold test	.13¼	.13½	.13¼	.13½	.13¼	.13½
240 vis., 5 color, 25-30 cold test	.12¾	.13	.12¾	.13	.12¾	.13
280 vis., 3 color, 25-30 cold test	.16¾	.17	.16¾	.17	.16¾	.17
280 vis., 4 color, 25-30 cold test	.15¾	.16	.15¾	.16	.15¾	.16
280 vis., 5 color, 25-30 cold test	.14¾	.15	.14¾	.15	.14¾	.15
Cylinder Stocks:						
600, steam refined, light green	.10	.12	.10	.12	.10	.12
600, steam refined, dark green	.09	.11	.09	.11	.09	.11
190-200 vis., D color Bright Stock	.41	.42	.41	.42	.41	.42
150-160 vis. D, color Bright Stock	.37		.37		.37	
150-160 vis., E color Bright Stock	.32	.35	.32	.35	.32	.35
Waxes:						
124-126 White Crude Scale Wax	.02½	.02⅝	.02½	.02⅝	.02½	.02⅝
PENNSYLVANIA—						
34 Neutral	.07¾		.07½	.07¾	.07½	.07¾
34 Sundebloom	.07¾		.07½	.07¾	.07½	.07¾
36 Miners' Neutral	.07½		.07¼	.07½	.07¼	.07½
150, 3 color	.16	.17	.15½	.16	.15½	.16
180, 3 color	.22		.21½	.22	.21½	.22
200, 3 color	.25½	.26	.25	.25½	.25	.25½
220, 3 color	.29	.30	.29½	.30	.29½	.30
600, steam refined	.24		.22½	.23	.22½	.23
635, steam refined	.28	.29½	.28½	.29	.28½	.29
650, steam refined	.30	.31	.29½	.30	.29½	.30
600, Pennsylvania Flash	.31	.33	.30½	.31	.29½	.30
630, Pennsylvania Flash	.35		.34½	.35	.34½	.35
600, E filtered	.29	.30	.28½	.30	.30½	.31
600, D filtered	.35		.34½	.35	.34½	.35
Pennsylvania Bright Stocks	.40	.42	.40	.40½	.41½	.42
*122-124 White Crude Scale Wax	.03		.02⅞	.03	.03⅛	
124-126 White Crude Scale Wax	.03⅛		.03	.03⅛	.03¼	
*At New York.						
GULF COAST (South Texas)—						
No. 2 color, 100 vis., pale oil	.06½	.06¾	.06½	.06¾	.06¼	.06½
No. 3 color, 200 vis., pale oil	.09¼	.09½	.09¼	.09½	.09¼	.09½
No. 3 color, 300 vis., pale oil	.10¾		.10¾		.10¾	
No. 3½ color, 500 vis., pale oil	.11½	.12	.11½	.12	.11½	.12
No. 4 color, 750 vis., pale oil	.13¼	.13½	.13¼	.13½	.13¼	.13½
No. 5 color, 1200 vis., pale oil	.16		.16		.16	
No. 5 to 6 color, 1200 vis., pale oil	.15		.15		.15	
No. 5 to 6 color, 200 vis., red oil	.08½	.08¾	.08½	.08¾	.08½	.08¾
No. 5 to 6 color, 300 vis., red oil	.09½	.10	.09½	.10	.09½	.10
No. 5 to 6 color, 500 vis., red oil	.10¾	.11¼	.10¾	.11¼	.10¾	.11¼

REFINERY AND CRUDE PRICES

Quotations on refined products are for interstate or export movement unless otherwise noted.

No. 5 to 6 color, 750 vis., red oil	.12¾		.12¾		.12¾	
No. 2½ color, 200 vis., pale filtered	.11	.12	.11	.12	.11	.12
No. 2½ color, 300 vis., pale filtered	.12	.13	.12	.13	.12	.13
No. 2½ color, 500 vis., pale filtered	.14½	.15	.14½	.15	.14½	.15
No. 2½-3 color, 750 vis., pale filtered	.17	.19	.17	.19	.17	.19
CALIFORNIA—						
130 vis., 2½-3 color	.10¼	.10½	.10¼	.10½	.10¼	.10½
200 vis., 2½-3 color	.11½	.11¾	.11½	.11¾	.11½	.11¾
300 vis., 3-3½ color	.13	.13½	.13	.13½	.13	.13½
350 vis., 3½-4 color	.13½	.13¾	.13½	.13¾	.13½	.13¾
400 vis., 3½-4 color	.15	.15½	.15	.15½	.15	.15½
Red Neutral:						
200 vis., 4½-5 color	.11	.11¼	.11	.11¼	.11	.11¼
300 vis., 5-6 color	.12	.12¼	.12	.12¼	.12	.12¼
400 vis., 5-6 color	.13¼	.14	.13¼	.14	.13¼	.14
500 vis., 4½-5 color	.14¼	.15½	.14¼	.15½	.14¼	.15½
500 vis., 5-6½ color	.15	.15¼	.15	.15¼	.15	.15¼
600 vis., 6½ plus color	.16	.16¼	.16	.16¼	.16	.16¼

Note—Bright stocks are not manufactured commercially on the Pacific Coast.

NEW YORK (BAYONNE) REFINERY PRICES

	Mar. 4		Feb. 25		Feb. 18	
Gasoline, U. S. Motor, 58-60.437	.08¼	.08½	.08½		.08½	.08¾
Kerosene, water white, 41-43	.07¾		.07¾		.07¾	
*Fuel Oil, Bunker "C," 14-16, per bbl.	1.05		1.05		1.05	
†Fuel Oil, Diesel, 28-30, per bbl.	2.00		2.00		2.00	
Gas Oil, 32-36 gravity	.04¾	.05¼	.04¾	.05¼	.04¾	.05¼
25 pale Paraffin Oil	.10½		.10½		.10½	
28 pale Paraffin Oil	.07¼		.07¼		.07¼	
28S red Paraffin Oil	.12½		.12½		.12½	
250 red Paraffin Oil	.11½		.11½		.11½	
225 red Paraffin Oil	.10		.10		.10	
200 red Paraffin Oil	.09¼		.09¼		.09¼	
Refined Wax:						
120-122 a.m.p., per lb.	.03⅝		.03⅞		.03⅞	
125-127 a.m.p., per lb.	.03⅞		.04⅛		.04⅛	
130-132 a.m.p., per lb.	.04⅝		.04⅝		.04⅝	
133-135 a.m.p., per lb.	.05⅛		.05⅝		.05⅝	
135-137 a.m.p., per lb.	.05¾		.05¾		.05¾	
Petrolatum in barrels, in carload lots, per pound:						
Dark Green	.01⅞		.01⅞		.01⅞	
Amber	.03⅜		.03⅜		.03⅜	
Extra Amber	.03½		.03½		.03½	
Cream	.06⅜		.06⅜		.06⅜	
Lily White	.06½		.06½		.07	
Snow White	.08⅜		.08⅜		.08⅜	

*Lighterage 5.0 cents a barrel extra.

NEW YORK (BAYONNE) EXPORT PRICES

	Mar. 4		Feb. 25		Feb. 18	
Kerosene, prime white	.07¾		.07¾		.07¾	
Kerosene, water white	.09		.09		.09	
600, steam refined cylinder stocks, in bbls.	.30	.31	.30	.31	.30	.31
635, steam refined	.32	.33	.32	.33	.32	.33
650, steam refined	.36	.37	.36	.37	.36	.37
600, Pennsylvania Flash	.40		.40		.40	
630, Pennsylvania Flash	.43		.43		.43	
600, Warren E	.39½		.39½		.39½	
600, Oil City E	.38½		.38½		.38½	
Light 140-150 Bright Stocks	.49½	.50	.49½	.50	.49½	.50
Dark 140-150 Bright Stocks	.48½	.49	.48½	.49	.48½	.49

LOS ANGELES EXPORT PRICES

	Mar. 4		Feb. 25		Feb. 18	
Kerosene, water white	.04½	.05	.04½	.05	.04½	.05
U. S. Motor Gasoline, 53-55, 437 e.p.	.06¼	.06¾	.06¼	.06¾	.06¼	.06¾

CRUDE OIL PRICES

OKLAHOMA, KANSAS, NORTH AND EAST CENTRAL TEXAS

Oklahoma City—Same as other Mid-Continent price schedule except Empire Pipe Line Co. posts all oil 40 gravity and above at $1.33 on February 15, 1930.

Corsicana heavy (Jan. 16, 1930)*.....$ .70
Other fields.....See gravity table

*Posted by Magnolia Petroleum Co.

TEXAS PANHANDLE

Gray County, Wheeler County and Carson-Hutchinson Counties—See gravity table.

WEST TEXAS

Iatan*.....Same as North Texas
Crane-Upton-Crockett, Pecos, Winkler and Mitchell.....See gravity table, column 3
Howard and Glasscock .....See gravity table, column 11
Chalk†.....$ .65

*Includes Westbrook Field.
†Posted by Humble Oil & Refining Co.

ARKANSAS-NORTH LOUISIANA

Smackover, below 24 gravity (May 20, 1929).....$ .85
Smackover, 24 gravity and above (May 20, 1929).....1.00
Cotton Valley, below 36 gravity (Jan. 17, 1930).....80
Bellevue (Jan. 17, 1930).....1.05
Urania (Jan. 16, 1930).....85
East El Dorado (May 22, 1929).....85
Other fields.....See gravity table

Cotton Valley crude about 36 gravity takes same gravity price schedule as shown for North Louisiana and Arkansas crude in Mid-Continent gravity price table.

Note—Smackover, Cotton Valley and Bellevue posted by Standard Oil Co. of Louisiana and Magnolia Petroleum Co.; Urania Grade A (Jan. 15, 1930)*.....$1.05 posted by Louisiana Oil Refining Corp.; East El Dorado, Magnolia Petroleum Co.

GULF COAST

Grade B.....See gravity table
Jennings, La. (Jan. 15, 1930)†.....1.00
Refugio (Jan. 20, 1930)¶.....55
Sorrento (Jan. 15, 1930)‡.....1.00
Markham (Jan. 15, 1930)§.....75
High Island (Jan. 15, 1930)¶.....85

*Humble Oil & Refining Co. †Gulf Pipe Line Co. ‡Sun Pipe Line Co. §The Texas Pipe Line Co. ¶Posted by Gulf Coast Pipe Line Co.

ROCKY MOUNTAIN STATES
Ohio Oil Co.-Midwest Refining Co.
(Effective Feb. 15, 1930)

Rock Creek, Wyo.....$1.25
Salt Creek.....See gravity table
Big Muddy.....$1.33
Grass Creek, heavy (July 27, 1928).....90
Grass Creek, light.....1.45
Mule Creek (May 21, 1929).....1.20
Elk Basin.....1.45
Lance Creek.....1.53
Poison Spider (March 14, 1927).....1.00
Notches (March 14, 1927).....95
Rex Lake (February 22).....1.10
Osage (May 21, 1929).....1.65
Lost Soldier (contract, May 22).....1.05
Hamilton Dome (March 14, 1927).....85
Pedro (May 21, 1929).....1.25
Greybull (May 21, 1929).....1.65
Four Bear (May 21, 1929).....85
Cat Creek (Montana) (Feb. 15, 1930).....1.45
Sunburst (Montana) (Feb. 15, 1930).....1.65
Torchlight (May 21, 1929).....1.65
Hogback (New Mexico) (May 21, 1929).....1.70
Artesia (New Mexico) (Feb. 15, 1930).....1.00

Note—Salt Creek, Osage, Cat Creek, Grey-

(Continued on Page 242)

CRUDE OIL GRAVITY TABLE

Gravity—	1 Okla., Kans., N. C. Texas	2 No. La. and Arkansas	3 Crane, Upton, Crockett, Winkler Pecos, Mitchell, (West Texas) Lea, N. Mex.	4 Stephens, Ark.	5 Wheeler (Texas Panhandle)	6 Gray County (Texas Panhandle)	7 Carson and Hutchinson (Texas Panhandle)	8 Salt Creek, Wyo.	9 Grade B and Light Crude (G. Coast)	10 Somerset, (South Central Texas)	11 Howard and Glasscock, W. Tex.
24 and above.	....	....	....	....	....	....	....	....	....	....	....
Below 24	....	....	....	....	....	....	....	....	....	....	....
Below 25	.60	....	.55	....	....	....	....	....	.90	....	.55
25 to 25.9	.66	....	.58	....	....	....	....	....	.93	....	.58
26 to 26.9	.72	....	.61	....	....	....	....	....	.96	....	.61
27 to 27.9	.78	....	.64	....	....	....	....	....	.99	....	.64
Below 28	....	.78	....	.90	.70	.69	.72	....	....	....	....
28 to 28.9	.84	.84	.67	.94	.70	.69	.72	....	1.02	....	.66
29 to 29.9	.90	.90	.70	.98	.70	.75	.72	.90	1.05	....	.68
30 to 30.9	.96	.96	.73	1.02	.76	.81	.72	.96	1.08	....	.70
31 to 31.9	1.02	1.02	.76	1.06	.82	.87	.72	1.02	1.11	....	.72
32 to 32.9	1.08	1.08	.79	1.10	.88	.93	.78	1.08	1.14	1.05	.74
33 to 33.9	1.11	1.11	.82	....	.91	.96	.81	1.11	1.17	1.07	.76
34 to 34.9	1.14	1.14	.85	....	.94	.99	.84	1.14	1.20	1.09	.78
35 to 35.9	1.17	1.17	.88	....	.97	1.02	.87	1.17	1.23	1.11	.80
36 to 36.9	1.20	1.20	.91	....	1.00	1.05	.90	1.20	....	1.13	.82
37 to 37.9	1.23	1.23	....	....	1.03	1.08	.93	1.23	....	1.15	....
38 to 38.9	1.26	1.26	....	....	1.06	1.11	.96	....	....	1.17	....
39 to 39.9	1.29	1.29	....	....	1.09	1.14	.99	....	....	....	....
40 to 40.9	1.32	1.32	....	....	1.12	1.17	1.02	....	....	....	....
41 to 41.9	1.35	1.35	....	....	1.15	1.20	1.05	....	....	....	....
42 to 42.9	1.38	1.38	....	....	1.18	1.23	1.08	....	....	....	....
43 to 43.9	1.41	1.41	....	....	1.21	1.26	1.11	....	....	....	....
44 and above.	1.44	1.44	....	....	1.24	1.29	1.14	....	....	....	....

Column 1, Note—Above prices posted by Prairie Oil & Gas Co. on February 15, 1930; by Sinclair Oil & Gas Co. February 13, 1930. On January 15, 1930, Humble Oil & Refining Co. posted North Central Texas crude at following prices: Below 25 gravity 60 cents; a 6-cent differential added per degree to 32-32.9 gravity at $1.08 and a 3-cent differential above making 44 gravity and above at $1.44. The Carter Oil Co. posted this schedule for Oklahoma and Kansas, January 16. Same date Magnolia posted these prices in North Central Texas. On January 17, Magnolia posted the schedule for Oklahoma and Kansas.

North Central Texas—Includes Ranger, Mexia, Powell, Richland, Wortham, Lytton Springs, Currie, Nocona and Moran Pools.

Column 2—Arkansas and North Louisiana—(Caddo, Bull Bayou, Crichton, Cotton Valley above 36 gravity, DeSoto, Haynesville, Homer and El Dorado only). Texas Pipe Line Co., January 15, 1930. Standard Oil Co. of Louisiana, Louisiana Oil Refining Co., Gulf Pipe Line Co., Magnolia Petroleum Co., January 16, 1930.

Column 3—Humble Oil & Refining Co., January 15, 1930, and Magnolia Petroleum Co., January 16, 1930.

Column 4—Atlantic Oil Producing Co. and Louisiana Oil Refining Corp., May 21, 1929. Columns 5, 6 and 7—Humble Oil & Refining Co., January 15, 1930, and Magnolia Petroleum Co., January 16, 1930. Adopted by Prairie Oil & Gas Co., February 15.

Column 8—Midwest Refining Co., February 15, 1930. All crude over 37 gravity $1.23 per barrel.

Column 9—Humble Oil & Refining Co., January 15, 1930 (schedule ends 35 and above).

Column 10—Grayburg Pipe Line Co. and Pioneer Oil & Refining Co., April 7.

Column 11—Humble Oil & Refining Co., January 15, 1930, Magnolia posted Howard-Glasscock crude same schedule as West Texas, January 16, 1930.

CALIFORNIA CRUDE OIL PRICES

Standard Oil Co.-Union Oil Co. (Effective January 18, 1929)

Gravity—	1 Salt Lake, Newport, Summerland, Lawndale, Los Angeles Fullerton, Richfield Torrance, Olinda-Brea Alamitos Heights, Huntington Beach, Signal Hill (Nov. 8) Athens, Inglewood, Rosecrans-Dominguez, Watsonville	2 Whittier, La Habra, Coyote Hills	3 Midway-Sunset, Elk Hills, Lost Hills, Belridge, Buena Vista Hills	4 Montebello	5 Santa Fe Springs (Nov. 8)	6 Santa Maria, Coalinga	7 Wheeler Ridge Fruitvale	8 Orcutt, Ventura, Rincon	9 Ventura Ave., (Nov. 8)	10 Elwood Terrace	11 Seal Beach (Nov. 4)
14 to 14.9	.70	.70	.50	.70	....	.50	.50	.55	.70	....	.70
15 to 15.9	.70	.70	.50	.70	....	.50	.50	.55	.70	....	.70
16 to 16.9	.70	.70	.50	.70	....	.50	.50	.55	.70	....	.70
17 to 17.9	.70	.70	.50	.70	....	.50	.50	.55	.70	....	.70
18 to 18.9	.75	.75	.56	.70	....	.56	.56	.70	.75	....	.76
19 to 19.9	.80	.80	.62	.75	....	.62	.62	.70	.80	....	.80
20 to 20.9	.85	.84	.68	.80	....	.68	.68	.70	.85	....	.85
21 to 21.9	.89	.88	.74	.85	.89	.74	.74	.86	.86	....	.89
22 to 22.9	.93	.91	.80	.90	.92	.80	.80	.87	.87	....	.93
23 to 23.9	.97	.94	.85	.95	.95	.85	.85	.90	.90	....	.97
24 to 24.9	1.01	.97	.90	.98	.98	.88	.88	.94	.94	....	1.01
25 to 25.9	1.05	1.00	.95	1.01	1.01	.91	.91	.98	.98	....	1.05
26 to 26.9	1.09	1.04	1.00	1.04	1.04	.94	.94	1.02	1.02	....	1.09
27 to 27.9	1.13	1.08	1.05	1.07	1.07	.98	.97	....	1.06	....	1.13
28 to 28.9	1.17	1.12	1.10	1.10	1.10	1.02	....	....	1.10	....	1.17
29 to 29.9	1.21	1.16	1.16	1.13	1.15	1.06	....	....	1.14	....	1.21
30 to 30.9	1.25	1.20	1.22	1.16	1.20	1.10	....	....	1.18	....	1.25
31 to 31.9	1.30	....	1.28	....	1.25	1.14	....	....	1.23	....	1.30
32 to 32.9	1.35	....	1.34	....	1.30	1.18	....	....	1.28	....	1.35
33 to 33.9	1.41	....	1.40	....	1.35	1.22	....	....	1.34	....	....
34 to 34.9	1.47	....	1.46	....	1.40	1.26	....	....	1.40	1.16	....
35 to 35.9	1.53	....	....	....	1.45	1.30	....	....	1.46	1.22	....
36 to 36.9	1.59	....	....	....	1.50	....	....	....	1.52	1.28	....
37 to 37.9	1.65	....	....	....	1.55	....	....	....	1.58	1.34	....
38 to 38.9	1.71	....	....	....	1.60	....	....	....	1.64	1.40	....
39 to 39.9	1.77	....	....	....	1.65	....	....	....	1.70	1.46	....
40 to 40.9	1.83	....	....	....	....	....	....	....	1.76	1.52	....
41 to 41.9	1.89	....	....	....	....	....	....	....	1.82	1.58	....
42 to 42.9	1.95	....	....	....	....	....	....	....	1.88	1.64	....

Kern River, Newhall-McKittrick, Mount Poso and Round Mountain 11 to 13.9 gravity 45 cents, 14 gravity and above 50 cents, effective October 2, 1929. On December 1, 1928, the Union Oil Co. posted Midway-Sunset, Elk Hills, Buena Vista, Lost Hills and Coalinga crude as follows: 11 to 13.9 gravity at 45 cents; 14 gravity and above 50 cents.

Column 1—Signal Hill, Seal Beach, Huntington Beach and Alamitos Heights crude, 14 to 32.9 gravity, inclusive; Richfield, Olinda-Brea and Fullerton, 14 to 30.9 gravity; Torrance and Inglewood, 14 to 28.9 gravity; Dominguez and Athens-Rosecrans, 24 to 42.9 gravity.

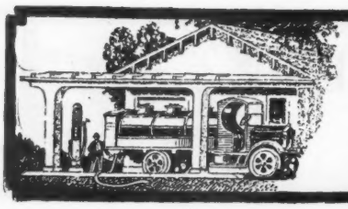
Column 2—Whittier crude, 14 to 22.9 gravity; Coyote Hills, 14 to 30.9 gravity.

Column 3—Kern River, Newhall and McKittrick, 11 to 19.9 gravity; Midwest-Sunset, Buena Vista and Elk Hills, 11 to 33.9 gravity; Lost Hills, 11 to 34.9 gravity; oil below 14 gravity posted at 45 cents.

Column 6—Oil below 14 gravity posted at 45 cents.

Columns 8 and 9—Posted by Union Oil Co. only.

Kettleman Hills, 55 gravity and above, $1.65 (posted by Standard Oil Co. of California).



TANK WAGON MARKETS

Tank wagon quotations for gasoline and kerosene in United States as furnished by the larger marketing concerns Mar. 4

ALL TANK WAGON AND SERVICE STATION QUOTATIONS INCLUDE TAXES

STANDARD OIL CO. (INDIANA)

	Gasoline			Kero.
	Tank wagon	Service station	Incl'ds tax	tank wagon
Chicago†	17.0	18.0	3.0	13.0
Decatur, Ill.	17.2	18.2	3.0	13.1
E. St. Louis	16.4	17.4	3.0	12.2
Joliet	17.4	18.4	3.0	13.3
Peoria	17.2	18.2	3.0	13.1
Quincy	17.2	18.2	3.0	12.9
Davenport, Ia.	17.5	18.5	3.0	13.3
Des Moines	17.5	18.5	3.0	13.3
Keokuk	17.5	18.5	3.0	13.3
Sioux City	17.1	18.1	3.0	12.9
Duluth, Minn.	18.5	19.5	3.0	13.9
Mankato	18.1	19.1	3.0	13.7
Minneapolis	18.2	19.2	3.0	13.9
LaCrosse, Wis.	17.2	18.2	3.0	14.0
Milwaukee	16.1	17.1	3.0	12.9
Madison	16.3	17.3	3.0	13.1
Detroit, Mich.	17.8	18.8	3.0	14.7
Grand Rapids	17.7	18.7	3.0	14.6
Saginaw	17.9	18.9	3.0	14.8
Evansville, Ind.	18.0	19.0	4.0	14.0
Fort Wayne	18.4	19.4	4.0	14.4
Indianapolis	18.2	19.2	4.0	14.2
South Bend	18.4	19.4	4.0	14.4
Fargo, N. D.	19.9	20.9	3.0	16.9
Huron, S. D.	19.3	20.3	4.0	14.7
Sioux Falls	18.1	19.1	4.0	14.4
K. C., Mo.*	16.9	17.9	3.0	11.6
Springfield*	16.8	17.8	3.0	12.5
St. Louis*	15.9	16.9	2.5	12.3
St. Joseph	16.5	17.5	2.0	12.2
Wichita, Kans.	15.8	14.8	3.0	11.8
Bartlesville, Ok.	16.5	17.5	4.0	11.5

*State tax 2 cents; remainder city tax.
†Effective February 20, discounts on Q.D.A. in Chicago district 2 cents off service station price on purchases of 500 gallons or more per month and 4 cents on purchases of 1,000 gallons or more per month.

NAPHTHA

	Tank wagon	Tank car
Oleum spirits	14.7	12.9
V. M. & P. Naphtha	16.7	13.9
Cleaner's naphtha	17.0	14.9
Stanisol	17.0	15.4

Tank wagon prices f.o.b. Chicago; tank car prices f.o.b. Whiting.

STANOLIND FURNACE OIL IN CHICAGO

Less than 100 gallons	9.0
100 to 349 gallons	8.0
850 gallons or more	7.5

Note—Outside Chicago furnace oil discount of 1 cent per gallon is given on deliveries of 100 to 349 gallons and 1½ cents on deliveries of 350 gallons or more.

The following quantity discounts from the service station price are allowed on monthly sales of gasoline; 2,000 gallons or less, 2 cents; more than 2,000 and less than 6,000 gallons, 2½ cents; more than 6,000 gallons, 3 cents; 100,000 gallons or more 4½ cents. Discounts are allowed each month and they are not cumulative. Delivery tickets showing date and quantity delivered must be sent to the seller before the tenth of the month to secure the discount on the previous month's purchases.

SOUTHWESTERN DISTRICT

Magnolia Petroleum Co.

	Gasoline			Kero.
	Tank wagon	Service station	Incl'ds tax	tank wagon
Dallas, Tex.	16.0	20.0	4.0	12.0
Fort Worth	16.0	19.0	4.0	12.0
Houston	15.0	19.0	4.0	11.0
San Antonio	15.0	19.0	4.0	11.0
El Paso	16.0	20.0	4.0	14.0
Texarkana	17.0	19.0	4.0	12.0
Muskogee*	14.0	16.0	4.0	10.0
Okla. City*	15.0	18.0	4.0	10.0
Tulsa*	15.0	19.0	4.0	10.0
Ft. Smith, Ark.	15.0	17.0	5.0	12.0
Little Rock	18.0	20.0	5.0	13.0

*Gasoline tank wagon price to dealers 2 cents under posted tank wagon.

ROCKY MOUNTAIN DISTRICT

Continental Oil Co.

	Gasoline			Kero.
	Tank wagon	Service station	Incl'ds tax	tank wagon
Denver, Colo.	18.0	21.0	4.0	15.5
Pueblo	18.0	21.0	4.0	15.5
Grand Junction	22.0	25.0	4.0	19.0
Casper, Wyo.	18.0	21.0	4.0	14.0
Cheyenne	19.5	22.5	4.0	15.5
Butte, Mont.	23.5	26.5	5.0	20.0
Helena	23.5	26.5	5.0	20.0
Salt Lake, Utah	20.0	23.0	3.5	17.0
Albu'que, N. M.	20.0	22.0	5.0	17.0
Boise, Idaho	22.5	25.5	4.0	19.0
Twin Falls	22.5	25.5	4.0	19.0

PENNSYLVANIA—DELAWARE AND PART NEW ENGLAND

The Atlantic Refining Co.

	Gasoline			Kero.
	Tank wagon	Service station	Incl'ds tax	tank wagon
Pittsburgh, Pa.	15.0	*21.0	...	13.0
Philadelphia	15.0	*21.0	...	13.0
Scranton	15.0	*21.0	...	13.0
Allentown	15.0	*21.0	...	13.0
Altoona	15.0	*21.0	...	13.0
Erie	15.0	*19.0	...	13.0
Dover, Del.	18.0	20.0	3.0	13.0
Wilmington	18.0	20.0	3.0	13.0
Springf'd, Mass.	16.5	18.5	2.0	13.5
Worcester	16.3	18.3	2.0	13.3
Boston	15.5	17.5	2.0	12.5
Providence, R.I.	15.7	17.7	2.0	12.7
Hartford, Conn.	15.5	17.5	2.0	13.5
New Haven	15.6	17.6	2.0	13.6

*Includes tax of 4.0 cents. Pennsylvania tax is collected by the dealer and paid by him direct to the State. The Atlantic Refining Co. recognizes a 2-cent per gallon discount on gasoline from its posted tank wagon markets on sales to dealers for purposes of resale. The Atlantic Refining Co. also recognizes a maximum discount of 2 cents per gallon on gasoline to commercial accounts under contract for one year.

NEW YORK AND PART OF NEW ENGLAND DISTRICT

Standard Oil Co. (New York)

	Gasoline			Kero.
	Tank wagon	Service station	Incl'ds tax	tank wagon
Albany, N. Y.	15.6	17.6	2.0	14.6
New York*	14.3	16.3	2.0	13.3
Buffalo	15.8	17.8	2.0	13.8
Rochester	16.0	18.0	2.0	13.0
Syracuse	16.8	18.8	2.0	13.8
Boston, Mass.	15.5	17.5	2.0	12.5
Augusta, Me.	18.8	20.8	4.0	13.8
Manch'r'r, N. H.	18.4	20.4	4.0	13.4
Burlington, Vt.	17.6	19.6	4.0	14.3

*Prices in steel barrels.

SOUTHERN DISTRICT

Standard Oil Co. (Kentucky)

	Gasoline			Kero.
	Tank wagon	Service station	Incl'ds tax	tank wagon
Atlanta, Ga.	20.0	21.0	4.0	15.5
Augusta	21.0	23.0	4.0	15.5
Macon	21.0	23.0	4.0	15.5
Savannah	20.0	22.0	4.0	14.0
Birm'ham, Ala.	19.0	21.0	4.0	14.5
Mobile	19.0	21.0	4.0	13.5
Montgomery	20.0	22.0	4.0	15.0
Clarks'le, Miss.	18.0	20.0	5.0	12.5
Jackson	19.0	21.0	5.0	13.0
Natchez	18.5	20.5	5.0	13.0
Gulfport	20.5	22.5	5.0	13.0
Vicksburg	18.5	20.5	5.0	13.0
Jack'ville, Fla.	20.0	22.0	6.0	14.0
Miami	21.0	23.0	6.0	14.0
Pensacola	18.0	20.0	6.0	13.5
Tampa	20.0	22.0	5.0	13.0
Lexington, Ky.	18.0	20.0	5.0	14.5
Covington	19.0	20.0	5.0	14.5
Louisville	19.0	21.0	5.0	13.0
Ashland	20.0	21.0	5.0	15.0
Catlettsburg	20.0	21.0	5.0	15.0

In addition to the state tax of 4 cents on gasoline, Montgomery has city tax of 1 cent on gasoline and one-half cent on kerosene. Kerosene prices in Georgia include 1-cent tax. In Florida, an inspection fee of 0.125 cent; in Alabama, an inspection fee of one-half cent on kerosene and one-fourth cent on gasoline. Pensacola and Mobile taxes include 1-cent city levy. Gulfport tax includes privilege tax of 2 cents in addition to state tax.

Effective April 2, price to dealers 2 cents under posted tank wagon price.

ATLANTIC COAST DISTRICT

Standard Oil Co. (New Jersey)

	Gasoline			Kero.
	Tank wagon	Service station	Incl'ds tax	tank wagon
Atlantic City	16.5	18.5	2.0	13.5
Newark, N. J.	15.5	17.5	2.0	12.5
Annapolis, Md.	18.0	20.0	4.0	13.0
Baltimore	17.2	19.2	4.0	10.5
Cumberland	19.0	21.0	4.0	14.0
Washington	15.7	17.7	2.0	12.7
Danville, Va.	19.8	21.8	5.0	13.8
Norfolk	18.3	20.3	5.0	11.0
Petersburg	19.3	21.3	5.0	13.3
Roanoke	20.0	22.0	5.0	14.0
Richmond	18.7	20.7	5.0	12.7
Charles'n, W.Va.	18.5	20.5	4.0	12.5
Keyser	19.1	21.1	4.0	14.1
Parkersburg	17.2	19.2	4.0	11.2
Wheeling	18.4	20.4	4.0	12.4
Charlotte, N. C.	20.3	22.0	5.0	14.3
Hickory	20.8	22.8	5.0	14.8
Mt. Airy	20.5	22.5	5.0	14.5
Salisbury	20.7	22.7	5.0	14.7
Charleston, S.C.	19.3	21.3	6.0	12.3
Columbia	21.2	23.2	6.0	14.2

A 2-cent per gallon discount off the gasoline tank wagon price is offered to dealers.

PACIFIC COAST TERRITORY

Standard Oil Co. (California)

	Gasoline			Kero.
	Tank wagon	Service station	Incl'ds tax	tank wagon
San Francisco	20.0	23.0	3.0	15.5
Los Angeles	19.5	22.5	3.0	15.5
Reno, Nev.	25.0	28.0	4.0	19.0
Portland, Ore.	25.5	23.5	3.0	16.5
Seattle, Wash.	19.5	22.5	3.0	16.5
Tacoma	20.5	23.5	3.0	16.5
Spokane	23.5	26.5	3.0	20.5
Phoenix, Ariz.	18.0	22.0	4.0	20.0

Above prices are at company's plant or depots as company does not operate stations. A 4-cent per gallon discount is given dealers and customers taking tank wagon lots except in Phoenix where discount is 1 cent.

NEBRASKA

Standard Oil Co. (Nebraska)

	Gasoline			Kero.
	Tank wagon	Service station	Incl'ds tax	tank wagon
Omaha	18.25	20.25	4.0	13.25
McCook	19.75	21.75	4.0	14.75
Norfolk	18.75	20.75	4.0	13.75
N. Platte	19.75	21.75	4.0	14.50
Scottsbluff	19.75	21.75	4.0	14.25

OHIO

Standard Oil Co. (Ohio)

	Gasoline			Kero.
	Tank wagon	Service station	Incl'ds tax	tank wagon
Ohio points*	18.0	19.0	4.0	†12.0

*Dealers and commercial accounts 2 cents under tank wagon.
†Service station price 14 cents.

CENTRAL SOUTH DISTRICT

Standard Oil Co. (Louisiana)

	Gasoline			Kero.
	Tank wagon	Service station	Incl'ds tax	tank wagon
N. Orleans, La.*	15.0	15.0	5.0	12.0
Baton Rouge	15.0	15.0	4.0	14.0
Alexandria	16.0	18.0	5.0	14.0
Lafayette†	17.0	19.0	5.0	14.0
Lake Charlest	16.0	18.0	5.0	14.0
Shreveport	15.0	17.0	4.0	14.0
Knoxv'le, Tenn.	19.0	21.0	5.0	16.0
Memphis	17.0	19.0	5.0	12.5
Chattanooga	19.0	21.0	5.0	16.0
Nashville	18.0	20.0	5.0	16.0
Bristol	19.0	20.0	5.0	14.0
Lt. Rock, Ark.	17.0	18.0	5.0	13.0

*Tax of 5 cents includes city tax of 1 cent. Louisiana kerosene prices include 1-cent state tax and 1-cent parish tax.
†Includes 1-cent parish tax.

TANK WAGON CHANGES

Standard Oil Co. of Louisiana reduced the gasoline station price 1 cent in Baton Rouge to 15 cents on February 22. On the same date the company reduced the gasoline station price 2 cents in Little Rock, Ark., to 18 cents. On February 26 the gasoline tank wagon and station prices were reduced 2 cents in Lake Charles, La., to 16 cents and 18 cents. On February 27 a general reduction was made throughout Tennessee, Arkansas and Louisiana in a number of additional points within the company's territory and the new prices are shown in the accompanying table.

Atlantic Refining Co. reduced the gasoline tank wagon and station prices 1 cent in Connecticut on February 26.

Standard Oil Co. of New York reduced the gasoline tank wagon and station price 1 cent in Greater New York and throughout Connecticut on February 26.

Standard Oil Co. of Indiana has added another classification in its discount schedule in the purchase of furnace oil whereby purchasers of 100,000 gallons or more obtain a discount of 4½ cents per gallon.

RIVERTON PLANT DELAYED

DENVER, Colo., Mar. 1.—Plans of the Midland Oil Refining Co to revamp and put into operation the refinery at Riverton, Wyo., have been delayed probably for another year as a result of litigation which has been pending in the courts for some time. The plant was purchased at a tax sale some time ago by the postmaster at Riverton while the Midland company purchased from the receivers. In a suit to quiet title, recently tried before Judge P. W. Metz of Basin, the court rendered a decision quieting title to the property in the name of the holder of the tax deed. Both real and personal property as a single lot was included in the sale.

The Midland company has announced that the case will be appealed to the supreme court. This refinery was constructed in 1917 by the Riverton-Wyoming Refining Co. E. C. Kingsbury, the promoter, subsequently encountered troubles with the court. When the Midland company bought from the receiver it again ran into a legal tangle growing out of the sale for taxes. The plant has never been in operation.

CRUDE OIL PRICES

(Continued from Page 241)

bull and Hogback posted by Midwest Refining Co., and the remainder by the Ohio Oil Co. Both companies posted Grass Creek light and Elk Basin.

SOUTH CENTRAL AND SOUTHWESTERN TEXAS

Darst Creek (Jan. 15, 1930)*	$1.05
Luling (Jan. 16, 1930)*	.75
Mirando (Jan. 15, 1930)†	.75
Salt Flat (Jan. 15, 1930)§	1.05
Rockdale Minerva (April 15):	
Below 28 gravity	1.25
28-38.9 gravity	1.27
39-39.9 gravity	1.29
40 and above	1.31
Thrall‡	...
Callihan (May 15)	1.75
Lytton Springs (Lockhart)	See gravity table
Somerset	See gravity table

*Posted by Magnolia Petroleum Co.
†Magnolia Petroleum Co., Humble Oil & Refining Co., Crown Central Pipe Line Co.
‡Thrall prices same as North Central Texas less 19½ cents per cwt. freight.
§Humble Oil & Refining Co.

EASTERN STATES

Joseph Seep Purchasing Agency
(Effective Feb. 17, 1930)

Penna Grade Oil in New York Transit Lines (New York)	$2.80
Bradford District Oil in National Transit Lines (Pennsylvania)	2.80
Penna Grade Oil in National Transit Lines (Pennsylvania)	2.80
Penna Crude Oil in Southwest Pennsylvania Lines (West Virginia)	2.75
Penna Grade Oil in Eureka Pipe Line Lines (Pennsylvania)	2.65
Penna Grade Oil in Buckeye Pipe Line Lines (Ohio)	2.45
Cabell Grade Oil in Eureka Pipe Line Lines (West Virginia) (May 22, 1929)	1.75
Corning 35-cent Grade Oil in Buckeye Pipe Line Co.'s Line (Feb. 17, 1930)	1.55
Corning 25-cent Grade Oil in Buckeye Pipe Line Co.'s lines (Feb. 17, 1930)	1.65
Somerset Oil in Cumberland Pipe Line Lines (Kentucky) (Feb. 17, 1930)	1.37
Ragland Grade Oil in Cumberland Pipe Line Lines (Kentucky) (Jan. 29)	.60
Wayne district oil in Cumberland Pipe Lines (Feb. 17, 1930)	1.24

*Oil run prior to July 1, 1929, $2.95.

MIDDLE WESTERN STATES

Ohio Oil Co.
(Effective Feb. 15, 1930)

Lima	$1.65
Wooster	1.75
Illinois	1.60
Indiana	1.42
Princeton	1.60
Plymouth	1.18
Waterloo (November 17, 1926)	1.35
Western Kentucky	1.50
Dundee, Mich. (Feb. 13, 1930)‖	
Same as Mid-Continent gravity scale	
Upper and Lower Traverse sands, Mich.‖	
Same as Mid-Continent gravity scale	
Midland, Mich. (Feb. 6, 1930)*	1.25
Saginaw, Mich., Saginaw sand (February 10)†	1.89
Saginaw, Mich., Berea sand (February 10)†	1.79
Cumberland, Clay, Barren, Clinton and Monroe Counties, Kentucky (March 15)†	1.50
Oil in line in Stoll Oil Refinery Co. in Oil City, Ky. (Feb. 19, 1930)§	1.45
Oil Springs (Canada) (Feb. 15, 1930)¶	2.12
Petrolia (Canada) (Feb. 15, 1930)¶	2.15

*Posted by Pure Oil Co.
†Posted by Sun Oil Co.
‡Posted by Paragon Development Co.
§Posted by Stoll Oil Refining Co.
¶Posted by Imperial Oil Co., Ltd.
‖Posted by Standard of Indiana for boat shipment.

MEXICAN CRUDE

Panuco*	$ .65

*Based on January transactions.

NATIONAL ADVERTISING

makes it easier for you to hold **YOUR REGULAR TRADE**

Everybody likes a **LEADER!**

And when a product is nationally advertised it has quality and value—it is a leader in its field! The dealer who carries that product is a leader in his community—his trade has greater confidence in him and his merchandise... When you sell nationally advertised gasoline and motor oil your good will is increased—your trade is easier to keep—and every new customer means an increase in volume—an increase in turnover—a step forward in progress. The Sinclair Opaline Signs on service stations, made familiar to tourists by advertising, are always friendly invitations to drive in!

SINCLAIR REFINING COMPANY, INC.
45 Nassau Street, New York
Atlanta · Boston · Chicago · Houston · Kansas City

SINCLAIR OPALINE
REG. U.S. PAT. OFF.

is nationally advertised as the **EXTRA SERVICE** *motor oil*

Vacuum Oil Company Explains Merger

Statement by Board of Directors Recites Considerations Which Led to Negotiation Now Awaiting Court Approval

After many months of negotiations the Vacuum Oil Co. and the Standard Oil Co. of New York, through their board of directors, have agreed upon a basis for the merger of the properties of the two companies.

A statement issued by the Vacuum Oil Co. board of directors says:

The business of the two companies is complementary in character. In general, the business of the New York company in the United States is primarily in crude production, refining and marketing of gasoline and kerosene; the business of the Vacuum company in the United States is primarily in the manufacture and marketing of high grade lubricating specialties for which it has established a worldwide reputation and market. The bulk of the business of the New York company is in the United States; the bulk of the business of the Vacuum company is in foreign countries.

The Vacuum company and the New York company have been pioneer American enterprises in building up an extensive business carried on within foreign countries. The lubricating products of the Vacuum company are marketed in practically every country in the world. In addition, the Vacuum company through numerous branches and locally incorporated Vacuum Oil Companies, does a valuable business in the marketing of gasoline and kerosene in important foreign markets, including Australia, Egypt, South, East and West Africa, and parts of Europe, where the New York company is not engaged in marketing these products. The activities of the New York company abroad have been principally in building up extensive storage and distributing facilities for the marketing of kerosene, gasoline, fuel oil and other products in the large markets of the Orient and India, in Aden and all of the markets of the Near East. In these markets by the union of the companies the Vacuum lubricating specialties and the gasoline of the New York company can be distributed to advantage in competition with other companies which market both products.

Protecting Foreign Markets

To maintain their position abroad against powerful foreign competitors, strongly entrenched as to crude supplies and refining and distributing facilities, the union of the complementary businesses of the New York company and Vacuum companies and their resources is regarded as vitally important and directly promotive of American interests in business in such countries. The crude supply of the New York company and its refining facilities for gasoline and kerosene will tend to protect and extend the marketing outlets which the Vacuum company has established for those products.

In the United States there have been rapid changes in conditions in the petroleum business which make this merger useful and appropriate for both companies. The prevailing method of doing business in the oil industry has come to be for each company doing a general business in petroleum products to have its own crude supply, its own refining facilities and to offer a full line of petroleum products through intensive local marketing facilities. The New York company, handling gasoline and petroleum products generally, has developed along these lines and has extensive facilities for distributing gasoline to motorists. In the United States, the Vacuum company, having devoted itself primarily to the manufacture and marketing of its high grade lubricants, has created a national consumer demand for its lubricating specialties. The merger will make available to the distinctive Vacuum products a very much wider distribution and sale, and it will also make available the large crude oil production of the subsidiaries of the New York company.

Extending Markets

The New York company's distributing facilities are in process of expansion in response to another prevailing tendency. In this automobile age, each large oil company handling gasoline primarily, although formerly marketing its products in only a portion of the country, now seeks to extend its activities generally throughout the United States so as to get the most complete use of its overhead organization, of its standing with its customers and of its national advertising. For example, the New York company originally confined its distributing facilities in this country to New York and New England where it had a great preponderance of the business. But at

TRANSACTIONS IN OIL SHARES ON NEW YORK STOCK EXCHANGE

Quotations Compiled by Francis, Bro. & Co., Associate Members of New York Curb, Kennedy Building, Tulsa, Okla.

1930 High	1930 Low	Week ended February 26 Sales	Week ended February 26 High	Week ended February 26 Low	Week ended February 26 Close	Stocks—		Outstanding capital	Par value	Div. rate	Last paid	1927 High	1927 Low	1928 High	1928 Low	1929 High	1929 Low
21⅞	18	1,800	18⅜	18⅛	18⅜	Amerada Corp.	(sh)	922,075	N.P.	50cQ	1-31-30	37⅝	27⅝	43⅞	27⅛	42⅝	17½
27⅛	20½	3,400	24½	23⅞	24⅜	American Republics Corp.	(sh)	209,180	N.P.	.....	3-20-29	82⅛	35⅛	85	51⅛	64¾	12½
37⅜	33	10	33	33	33	Associated Oil		$57,260,300	$25	50cQ	12-31-29	50¼	35	53⅜	37½	47¼	34½
42⅞	36¼	7,600	40½	38⅛	40	Atlantic Refining		$50,000,000	$25	25cQ	12-16-29	131⅜	104	66⅜	50	77⅞	30
24¼	20½	4,600	22⅛	20¾	22⅛	Barnsdall Corp.		$45,235,650	$25	50cQ	12- 7-29	35½	20¾	53	20	49⅛	20
23⅞	19½	2,300	21	19⅞	20⅞	Continental Oil of Delaware	(sh)	4,741,554	N.P.	.....	3-31-27	..	..	..	..	47⅛	18
59¾	49⅛	2,400	56¼	54	55	General Asphalt		$20,785,400	N.P.	50cQ	.....	96¾	65	94⅞	68	94¾	42¼
70½	52¼	5,400	65	61	64½	Houston Oil		$25,000,000	$100	.....	.....	175¾	60½	167	79	109	26
23½	20¼	4,900	21¾	20⅝	21¾	Independent Oil & Gas	(sh)	1,333,572	N.P.	50cQ	1-31-30	32¾	17⅝	38⅜	21¾	39⅜	17¾
23¾	17¾	5,100	20⅞	19⅞	20¾	Indian Refining		$12,307,370	$10	.....	5-31-24	12⅛	7⅝	39⅝	9	53	13⅛
22½	21¼	200	22⅛	22⅛	22⅛	Lago Oil & Transport	(sh)	3,992,122	N.P.	.....	5- 1-27	37¾	20½	39⅛	27⅜	38⅜	16½
9½	8⅛	200	8½	8¼	8½	Louisiana Oil Refining	(sh)	1,190,063	N.P.	.....	.....	18⅛	10	19¾	9⅜	18	7
6¾	5⅛	400	6½	5½	6½	Maracaibo Oil	(sh)	330,000	N.P.	.....	.....	22¾	12	25½	12½	18½	5⅛
21¾	16⅛	34,100	21¼	19⅛	21¼	Mexican Seaboard	(sh)	1,276,873	N.P.	.....	12-15-20	9¼	3	73	4⅝	69⅜	9¼
28	23½	1,500	24½	23⅝	24½	Mid-Continent Petroleum	(sh)	1,857,912	N.P.	50cQ	12-15-29	39⅜	25½	44½	25⅛	39⅞	22⅛
1⅛	1	200	1⅛	1	1	Middle States, ctfs.		$24,298,850	$10	.....	7- 1-23	3¾	1⅝	7⅜	2⅜	5⅛	¾
60½	51⅝	400	53	52⅜	53	Pan American P. & T.		$50,084,700	$50	.....	10-20-27	65⅞	40⅛	54⅞	38¼	69	40½
60¼	50½	1,100	53	52	53	Pan American P. & T. "B"		$121,105,050	$50	.....	11-15-24	66⅜	40¼	58⅞	37¾	69¼	40½
						Pan American Western B§		400,000	N.P.	.....	1-30-27	37⅞	16¾	28⅜	15½	18½	13⅝
5⅜	4⅛	1,000	4½	4⅛	4½	Panhandle P. & R.	(sh)	199,370	N.P.	.....	.....	18⅞	8	21¾	11½	15¼	3
50	47½	300	50	50	50	Panhandle P. & R. pfd.		$2,564,400	$100	.....	7- 2-23	83	54	108	70	76	47½
35	29⅛	5,700	33	31¼	32½	Phillips Petroleum	(sh)	2,406,796	N.P.	50cQ	1- 2-30	60¼	36¼	53⅞	35¼	47	24¼
1⅜	1	200	1⅛	1⅛	1⅛	Pierce Oil Corp.		$29,622,831	$25	.....	.....	1⅛	½	5¼	½	3⅜	1
3⅜	2¼	1,000	2¾	2½	2¾	Pierce Petroleum	(sh)	2,500,000	N.P.	.....	.....	5½	2½	7	3½	5⅞	½
52¼	46	4,700	47	46	46⅞	Prairie Oil & Gas		$61,720,125	$25	50cQ*	12-31-29	55½	45⅝	68	46	65⅝	40½
60	57	5,000	59	57	59	Prairie Pipe Line		$101,250,000	$25	75cQ†	12-31-29	190	130¾	280	172	65	45
9½	6½	1,800	7	6½	7	Producers & Refiners		$37,438,950	$50	.....	9-15-23	33⅞	16¾	29⅞	16	25⅞	4
32½	31	100	31	31	31	Producers & Refiners pfd.		$2,845,350	$50	.....	5- 1-25	50	36⅞	49⅝	41	46¾	25½
24⅜	21¼	3,800	21⅞	21⅛	21⅞	Pure Oil		$75,959,250	$25	37½cQ	12- 2-29	33½	25	31⅝	19	30⅜	20
26½	22¼	1,500	24⅝	24	24⅝	Richfield Oil		$47,964,650	$25	50cQ	11-15-29	28⅝	25⅜	56	23	49⅝	20
19½	16½	4,500	19	18¼	19	Rio Grande Oil	(sh)	1,200,000	N.P.	$2.00A	7-25-29	..	..	37½	32	42½	15
54⅝	49¼	2,300	50⅞	50¼	50⅜	Royal Dutch, N. Y.	(sh)	611,303	$1.873	.....	9-13-29	54½	44¼	64	44⅝	64	43⅛
47	42¾	80	42¾	42¾	42¾	Shell Transport & Trading Co.		£19,654,274	£1	$1.45	7-23-29	48⅝	40½	47⅞	41⅜	57½	40⅝
23⅝	21	7,400	21½	21⅛	21⅜	Shell Union Oil	(sh)	13,000,000	N.P.	35cQ	12-31-29	31¾	24⅝	39¼	23¼	31¾	19
28¼	22⅞	900	24¾	23	24¾	Simms Petroleum		$8,060,380	$10	40cQ	12-14-29	25⅜	14¼	27¼	18⅛	40⅛	15
25¾	21⅝	36,800	24¾	22⅞	24¾	Sinclair Consolidated	(sh)	5,500,000	N.P.	50cQ	1-15-30	22⅜	15	46¾	17⅜	45	21
111	109	300	109	109	109	Sinclair Consolidated pfd.		$16,025,250	$100	$2Q	11-15-29	104½	97	110	102½	111	103
32¼	28⅞	2,300	30	28⅞	29⅞	Skelly Oil		$27,237,750	$25	50cQ	12-16-29	37⅜	24⅛	42⅝	25	40½	28
61⅝	55½	5,200	60¾	58¼	60¾	Standard Oil of California	(sh)	12,594,098	N.P.	62½cQ	12-16-19	60¾	50⅜	80	53	81⅞	51½
66¾	58	22,300	60¾	58⅝	60⅜	Standard Oil of New Jersey		$620,079,800	$25	25cQ*	12-16-29	41⅜	35⅛	59⅜	37¾	83	48
33¾	31¼	20,500	33⅛	32¼	33⅛	Standard Oil of New York		$434,094,575	$25	40cQ	12-16-29	34⅛	29¾	44¼	28¾	48⅛	31¾
59⅜	53	300	53½	53½	53½	Sun Oil	(sh)	1,297,627	N.P.	25cQ	12-16-29	34⅞	30	77	31½	86⅜	55
7⅜	5¼	2,200	5¾	5½	5¾	Superior Oil Corp.	(sh)	2,324,938	N.P.	.....	12-20-20	..	..	..	..	24	5¼
56¼	50⅞	5,000	52⅞	51¼	52¾	The Texas Corporation		$211,076,650	$25	75cQ	1- 1-30	58	45	74¾	50	71⅞	50
10¾	9	400	9¼	9¼	9¼	Texas Pacific Coal & Oil Co.		$8,380,340	$10	2½%A‡	12-31-29	18⅞	12	26⅝	12⅛	23⅞	9½
21⅞	19½					Tide Water Oil	(sh)	2,191,759	N.P.	20cQ	12-31-29	29⅛	19	41½	19⅝	40	14
90	86¼	100	86½	86½	86½	Tide Water 5½% pfd.		$20,705,200	$100	$1.25Q	11-15-29	90⅛	85	100⅛	86	97½	85⅛
13¼	10¾	900	11½	11	11½	Tide Water Associated	(sh)	4,796,158	N.P.	30cS	2-15-30	19⅛	15¾	25	14¾	23½	10
84	78	800	80	80	80	Tide Water Associated pfd.		$72,844,300	...	$1.50Q	2- 2-30	..	..	..	..	90⅞	74⅛
10⅛	7¾	7,500	8¼	7¾	8¼	Transcontinental Oil	(sh)	3,742,029	N.P.	.....	.....	10⅜	3¾	14¾	7¼	15¼	5⅛
46¼	41¼	2,900	43¾	42¼	43½	Union Oil of California		$94,798,100	$25	50cQ	11- 9-29	56½	39⅝	58	42⅜	57	42⅛
36¼	33½	300	33½	33½	33½	Union Tank Car		$31,061,200	$100	$1.25Q	12- 2-29	127½	94	128⅛	110	163¾	121⅞
20⅞	16⅝	2,400	18¾	18¾	18½	Warner-Quinlan	(sh)	356,000	N.P.	50cQ	1- 2-30	34½	24½	44⅞	26	42⅞	15
28¼	26	1,400	28¼	27½	28⅛	White Eagle Oil & Refining	(sh)	490,000	N.P.	50cQ	1-20-30	27½	20	38	20⅛	38	25
15	11½	200	11½	11½	11½	Wilcox Oil & Gas	(sh)	2,400,000	N.P.	.....	5-10-28	..	..	..	..	29¾	12⅞

*Plus extra dividend of 25 cents. †Plus extra dividend of 50 cents. ‡Payable in stock. x Ex-dividend. §Stocks not sold since January 1, 1930.
In comparing highs and lows for the several years in the three tables it will be necessary to take into consideration cases where there have been splits in the stock.

present there are now actively competing with each other in that territory, in addition to numerous local companies, not less than 11 separate and distinct major concerns each with widely developed distributing facilities in this territory and a number of them already having nationwide distribution for their products. In line with this tendency the New York company has already in the last few years extended its distribution into the West and Southwest. The Vacuum company has for years had a nationwide reputation for its highly-specialized lubricants, which will be of advantage to the New York company in further extending its marketing of gasoline.

The united company, in addition to the specialized lubricating products of the Vacuum company, will market, it is estimated, about 9 per cent of the petroleum products consumed in the United States, an amount comparable in volume with the business done by each of several of the larger of its numerous competitors. In foreign countries it will carry on the widespread and important business above described.

The Legal Position

As to the permissibility of a union of two former subsidiaries of the Standard Oil Co. of New Jersey counsel have advised that this question was raised before the Supreme Court of the United States in the dissolution case and that the court held that after the subsidiaries had been freed from the control of the Standard Oil Co. of New Jersey they would be entitled to pursue any course of conduct lawful for anyone else.

There being no available method for asking the courts for an advisory expression as to the specific situation now arising, the only way to secure a ruling was for the companies to proceed and let the matter be brought before the courts in an appropriate way for determination.

Preserving Existing Good Will

Among the important assets of each of the present companies is the good-will attached to its name and the confidence of the public in its management and personnel. To preserve these assets there will be organized two subsidiary corporations of General Petroleum Corp., to be known respectively as "Vacuum Oil Co., Inc." and "Standard Oil Co. of New York, Inc.," in order that the present business of the respective companies may be carried on as in the past under present management, thus preserving the values of the corporate names, trademarks and organizations of the two companies. The Vacuum customers can thus feel assured that the high-grade lubricants and all other distinctive Vacuum products will be manufactured and marketed in all the world's markets by and through Vacuum organizations with the management and personnel with which

(Continued on Page 249)

INDEPENDENT OILS ON NEW YORK CURB

Quotations Compiled by Francis, Bro. & Co., Associate Members of New York Curb, Kennedy Building, Tulsa, Okla.

1930 High	1930 Low	Week ended February 26 Sales	High	Low	Close	Stocks—		Outstanding capital	Par value	Div. rate	Last paid	1927 High	1927 Low	1928 High	1928 Low	1929 High	1929 Low
¼	1/16	11,500	1/16	⅛	1/16	Amer. Con. Oilfields		$11,018,000	$5	.....	.....	2 7/16	.55	1½	.53	72c	1/16
3¼	1½	500	2	2	2	Amer. Maracaibo	(sh)	700,000	N.P.	.....	.....	7½	2¾	9½	3⅛	8⅝	1⅛
1⅜	1¼	100	1¼	1¼	1¼	Argo Oil	(sh)	683,971	$10	.....	.....	2¾	1	4½	2¼	5	1½
						British American§		1,311,321	N.P.	25cQ•	1- 2-30	40	20½	55	32¾	62	7⅞
1½	¾	300	1¼	1¼	1¼	Carib. Syndicate		$131,250	25c	.....	.....	28¼	15½	4½	3⅞	4⅞	1
33	26½	15,000	32⅞	32⅝	32⅞	Cities Service	(sh)	24,290,359	N.P.	30cA†	1- 2-30	58¾	40¼	90⅞	54	68⅛	20
89⅞	88	300	88¾	88½	88¾	Cities Service pfd.	(sh)	1,500,000	N.P.	50cM	1- 2-30	95⅜	87	103½	94½	98¾	84
¾	¼	400	⅜	⅜	⅜	Colombia Syndicate		$2,000,000	$1	.....	.....	3⅞	1⅛	3¼	.76	2	½
5¼	4⅛	100	4⅛	4⅛	4⅛	Cons. Royalty		$5,000,000	$10	15cQ	10-25-29	9¾	6⅜	8⅞	6¼	11⅛	2½
6⅝	5⅝	1,300	6	5¾	5¾	Creole Petroleum	(sh)	5,977,973	N.P.	.....	.....	14⅞	9½	17½	9½	11⅜	5⅝
⅞	¼	800	⅞	⅝	⅞	Crown Central	(sh)	578,000	N.P.	.....	.....	3	.50	3¼	.76	2½	¼
8¾	7¼	200	8	8	8	Darby Petroleum	(sh)	1,019,392	N.P.	25cQ	1-15-30	12	4	33½	3¼	26	6½
5¾	4⅝	300	4¾	4¾	4¾	Derby Oil & Refining	(sh)	500,000	N.P.	.....	.....	2½	74	2¼	1	11	2
						Derby Oil & Refining pfd.§		48,500	N.P.	.....	.....	16¾	4	21⅛	7½	44	20¾
144	131¼	2,400	134½	133⅞	134⅛	Gulf Oil Corp.	(sh)	4,504,921	$25	37½cQ	1- 1-30	118	86¼	165	101⅛	209	115
1½	⅞	3,300	1	1	1	Intercontinental Pet.		$5,682,000	$5	.....	.....	2½	.80	3⅜	1	2⅞	⅜
2⅛	1⅞	100	2	2	2	Kirby Petroleum	(sh)	750,000	N.P.	.....	.....	2¼	1⅛	3	1¼	3⅝	1¼
1⅞	1⅛	200	1⅜	1⅜	1⅜	Leonard Oil & Dev.		$50,000,000	$25	.....	.....	10⅞	5⅛	9⅜	5⅛	6⅛	1
22	18⅝	200	20	20	20	Lion Oil & Refining	(sh)	250,000	N.P.	50cQ	1-31-30	27½	20	43⅞	20	38⅞	18
39¾	34¼	300	36½	36½	36½	Lone Star Gas	(sh)	5,000,000	N.P.	20cQ	12-31-29	59⅜	37	69⅛	48½	67⅞	28
1/16	¼	700	1/16	1/16	1/16	Magdalena Syndicate	(sh)	850,000	$1	.....	.....	2⅞	.80	1⅞	.50	1¼	¼
						Margay Oil§		160,000	N.P.	50cQ	1-10-30	52	12	48½	32	38½	14
3½	2	300	2½	2½	2½	Mexico-Ohio Oil		.....	...	.....	.....	12⅛	5	8	2¾	6⅜	2½
⅝	½	100	½	½	½	Mountain & Gulf		$4,000,000	$1	2cQ	1-15-30	1½	1	1¾	.76	1½	¼
9⅜	8	1,300	8⅞	8½	8¾	Mountain Producers		$1,682,182	$10	40cQ	1- 2-30	29¼	22¾	28⅞	19½	22⅞	7
2⅞	2½	200	2⅞	2⅞	2⅞	New Bradford Oil		$1,095,291	$5	12½cQ	1-15-30	5⅞	4⅝	5⅝	4¼	5	2¼
6¼	3½	600	6⅞	6⅜	6⅞	New Mex. & Arizona		$1,000,000	$1	.....	.....	16	9¼	11⅞	7⅛	9⅜	2¼
8½	6⅞	500	7¼	6⅞	6⅞	North Central Texas	(sh)	400,000	N.P.	15cQ	12- 2-29	12⅜	9½	14¼	8½	18½	6⅛
1⅞	1	1,000	1¾	1¾	1¾	Pandem	(sh)	489,875	N.P.	.....	.....	9⅜	3⅞	6	2⅛	3½	½
4	1⅞	1,400	3⅜	2¾	2¾	Pantapec Oil	(sh)	1,506,600	N.P.	.....	.....	12⅛	7	15⅝	8½	10¼	1⅞
						Pennok Oil§		150,000	N.P.	.....	.....	13½	5⅛	7¾	4⅞	7¾	4⅜
10	9	200	9	9	9	Red Bank Oil	(sh)	250,000	N.P.	.....	.....	24⅜	7	18	4⅞	16	9⅝
3	2¼	500	2½	2¼	2⅜	Reiter-Foster	(sh)	388,584	N.P.	10cQ	12- 2-29	15½	3½	12⅞	4⅛	8½	1⅛
4⅜	3⅝	100	3¾	3¾	3¾	Ryan Consolidated	(sh)	500,000	N.P.	.....	.....	7	4½	12	4⅛	11	3
2⅜	2	1,300	2	2	2	Salt Creek Consolidated	(sh)	1,286,300	$10	10cQ	1- 2-30	8	5¼	7¼	5½	5⅞	1⅞
12⅜	10	200	12⅛	12⅛	12⅛	Salt Creek Producers	(sh)	1,496,859	$10	50cQ	2- 1-30	35½	27¼	35	23⅛	25⅞	9
						Savoy Oil§		$750,000	$5	.....	.....	7	1¼	3½	1	2½	1/16
19½	16	500	16½	16¼	16½	Transcontinental pfd.		.....	...	.....	.....	..	..	..	..	..	..
4¼	2¼	200	3	3	3	Venezuelan Petroleum	(sh)	755,090	$5	5cQ	11-15-29	7⅜	4¼	9⅛	4¾	6½	1⅜
3	2¼	200	2¼	2¼	2¼	Woodley Petroleum		$500,000	$1	.....	.....	7	4⅜	8¼	4⅞	9½	2
						Y Oil & Gas (new)§		100,000	N.P.	.....	.....	6	1¾	8⅜	2⅛	2⅞	¼

•Including one-half per cent monthly in stock. x Ex-dividend. †Payable monthly and a monthly stock dividend of one-half per cent. ‡Cents per share.
§Stocks have not sold since January 1, 1930.

STANDARD OIL STOCKS ON NEW YORK CURB

Quotations Compiled by Francis, Bro. & Co., Associate Members of New York Curb, Kennedy Building, Tulsa, Okla.

1930 High	1930 Low	Week ended February 26 Sales	High	Low	Close	Stocks—	Outstanding capital	Par value	Div. rate	Last paid	1927 High	1927 Low	1928 High	1928 Low	1929 High	1929 Low
17⅜	15	700	16¾	16¾	16¾	Anglo-American Oil (nv)	£4,192,635	£1	.36⅔	11-27-29	21⅝	17⅞	22⅜	14⅞	17	11
⅞	¾	200	¾	¾	¾	Atlantic Lobos	.....	...	.....	.....	..	..	..	..	..	..
						Borne Scrymser§	$1,000,000	$25	$1S.A.	10-15-29	69	50	56½	44½	46½	25
69	65¼	300	65⅞	65⅞	65⅞	Buckeye Pipe Line	$10,000,000	$50	$1Q	12-14-29	60	45	76	53	74¼	55
166½	155	100	160	160	160	Chesebrough Mfg.	$3,000,000	$25	$1Q•	12-30-29	126	76½	161	117	210	130
15⅞	12⅛	100	12⅛	12⅛	12⅛	Continental Oil	$36,057,840	$10	.....	12-15-27	22⅝	16¼	23	16	29	10
53	43	50	47	47	47	Cumberland Pipe Line	$1,500,000	$50	$1Q	12-15-29	137	89	114	67	75¾	40
						Eureka Pipe Line§	$5,000,000	$100	$1Q	11- 1-29	68½	47	88	64½	70½	42
3½	3	200	3½	3⅛	3⅛	Galena Signal Oil ctfs of dep.	$16,000,000	$100	.....	.....	13½	3½	13	4¼	6½	3
87½	78	1,400	84⅞	82	83¾	Humble Oil & Refining	$74,103,300	$25	50cQ	1- 1-30	68½	54	114¾	59¼	128	74⅜
310	305	450				Illinois Pipe Line	$20,000,000	$100	$10S.A.	12-16-29	182	123¾	290½	176½	340½	260
27⅜	22⅛	2,200	23	22⅛	23	Imperial Oil Co., Ltd.	26,421,768	N.P.	12½cQ	12- 2-29	64¾	37¾	104	56¾	41	22
41	38⅝	200	39½	39½	39½	Indiana Pipe Line	$3,000,000	$10	50cQ‡	2-15-30	94½	61	91⅞	74⅜	41⅞	26
21⅞	17⅞	2,900	18⅝	18	18⅝	International Pet.	14,247,088	N.P.	12½cQ	12-16-29	29	28¼	55	35	30⅜	15
22⅜	20	x100	20	20	20	National Transit	$6,362,500	$12.50	25cQ‡	12-16-29	24	13½	32⅜	19⅜	25⅛	10½
						New York Transit§	$1,000,000	$10	40cQ§	1-15-30	44½	31¼	75	38½	17½	10
54	50	100	50	50	50	Northern Pipe Line	$2,000,000	$50	$2S.A.	1- 2-30	100	70	69	56½	63	41
71¼	66⅛	300	68⅛	68	68⅛	Ohio Oil	$60,000,000	$25	50cQ‡	12-14-29	67⅞	52	84	58½	79⅞	64⅛
22½	20	300	20⅛	20⅛	20⅛	Penn Mex. Fuel	$10,000,000	$25	50cQ	12-14-29	39	12	84	28	44½	20
33	31	200	32	31	32	Solar Refining	$4,000,000	$25	$1.25S.A.	12-20-29	..	..	..	..	50	29
16¾	13	100	14	14	14	Southern Pipe Line	$1,000,000	$10	50cQ	.....	27¼	15½	19	15	22½	13
41⅛	37½	100	38	38	38	South Penn Oil (new)	$30,000,000	$25	50cQ	12-30-29	41½	35	71⅞	36¾	60¼	35⅛
63	60	300	60	60	60	Southwest Pa. Pipe Lines	$1,750,000	$50	$1Q	10- 1-29	83	55½	102	70	70	60
54⅝	49⅞	4,500	50¾	50⅛	50¾	Standard Oil of Indiana	$348,175,069	$25	62½cQ‡	12-16-29	81½	64⅝	95⅞	70⅞	63	45
30	27¼	x200	28	28	28	Standard Oil of Kansas	$8,000,000	$25	50cQ	12-16-29	20⅞	14⅝	37¾	15	33¾	18
37⅛	33¼	400	35½	35¼	35¼	Standard Oil of Kentucky	$25,654,516	$10	40cQ	12-16-29	130	111½	179¾	122¼	46⅞	29
48¼	44¼	300	48	48	48	Standard Oil of Nebraska	$4,649,225	$25	62½cQ‡	12-20-29	49½	40	54⅞	39⅞	50¼	40
88⅜	81	100	86	86	86	Standard Oil of Ohio	$14,000,000	$25	62½cQ	1- 2-30	87½	72	134	71	129	60
10	10	100	10	10	10	Swan-Finch Co.	$861,466	$25	.....	12- 2-29	21	14½	23½	16	18	10
96⅞	88⅛	2,300	95⅜	91⅝	95⅜	Vacuum Oil Co.	$126,180,350	$25	$1Q	12-20-29	..	..	111	72	133¾	75

Note—High and low on all stocks selling this week are for 1930.
*Plus 50 cents extra. †Stocks not sold since January 1, 1930. ‡Plus 25 cents extra. §Plus 10 cents extra. x Ex-dividend.

ROCKY MOUNTAIN AREA

(Continued from Page 231)

Canning, NW SE, Section 33-9n-5w, to cement off the flow. There are four wells now drilling in the new field and seven proposed, besides numerous wells reported located on outside leases that will be drilled this season.

Rocky Mountain Production

Daily average pipe lines runs from the various pools in the Rocky Mountain area for the week ending March 1:

WYOMING	
Salt Creek	33,940
Frannie	400
Big Muddy	2,070
Oregon Basin	3,900
Dutton	....
Elk Basin	720
Ferris	40
Grass Creek	2,040
Hamilton	920
LaBarge	2,400
Lance Creek	170
Lost Soldier	3,460
Osage	670
Poison Spider	140
Rock River	2,200
Rex Lake	90
Lander	410
Simpson Ridge	....
Teapot Dome	20
Greybull	....
Total	53,590
MONTANA	
Cat Creek	1,230
Kevin-Sunburst	4,940
Pondera	2,400
Lake Basin	70
Total	8,640
COLORADO	
Moffat	3,137
Fort Collins	1,521
Florence	759
Iles	1,030
Tow Creek	361
Boulder	25
Rangley	100
Total	4,933
NEW MEXICO	
Artesia	749
Cap Rock (Maljamar)	1,127
Hogback	420
Rattlesnake	718
Table Mesa	112
Jal	1,544
Hobbs High	22
Getty	....
Lea	6,305
Miscellaneous	285
Total	11,283
Grand total	78,446

REFINERY CURTAILMENT SUGGESTED BY WILBUR

(Continued from Page 53)

to the present six-day runs. This would not necessitate any complete shutdowns and losses in operating efficiency would be relatively small. This plan would involve a daily curtailment of apparently 15 per cent.

Other States

Surprise has been expressed that the shutdown suggestion was sent only to the governors of California, Texas and Oklahoma. While these three States produce approximately 85 per cent of the crude oil in the United States, they do not occupy a dominating position in refining.

The Oil and Gas Journal's annual refinery survey, which is published in this issue, shows that the capacity of the operating refineries in the United States totals 3,721,360 bbls. daily. Of this total, Texas has 813,700 bbls.; California, 890,800 bbls.; and Oklahoma, 313,900 bbls. Thus the three States only have 55 per cent of the total operating capacity.

Other states with a large refining capacity are: New Jersey, 321,000 bbls.; Louisiana, 207,780 bbls.; Indiana, 175,000 bbls.; Pennsylvania, 236,500 bbls.; Illinois, 135,500 bbls.; Kansas 133,000 bbls.; Arkansas 48,000 bbls.; Maryland, 54,000 bbls.; and Wyoming, 91,000 bbls. Several additional states have one or more plants.

It is felt that any curtailment program to be of lasting benefit would have to include the refining industry generally with an equitable curtailment in all refining groups.

In Washington on Monday, Secretary Wilbur when asked for a further statement regarding his plan said:

"We are simply trying to bring out the fact that gasoline stocks being greater than ever before there is great danger of waste and we are simply making a suggestion to refiners. We have no power to do more than make this suggestion. If it is impracticable to shut down one day a week the refiners will express their views on that."

HUMBLE TO CURTAIL

HOUSTON, Tex., Mar. 4.—In response to the suggestion of the Federal Oil Conservation Board that gasoline refining operations be put upon the basis of a six-day week in order that the waste incident to the increasing of surplus stocks may be avoided, the Humble Oil & Refining Co. and Humble Pipe Line Co. will immediately put into effect the following policy:

"On Sunday, March 9, and each Sunday thereafter until further notice these companies will shut down all drilling, producing, transporting, and refining operations. Where physical conditions make this impracticable, such operations throughout the week will be reduced one-seventh by volume. Notwithstanding the decrease in operations no reduction in personnel and no reduction in payroll is now contemplated.

"These companies have not participated in the accumulation of excess stocks of crude and gasoline and their operating program is now in balance; nevertheless they are adopting this policy, both on account of their consistent desire to cooperate with the conservation authorities and also because they see in this suggestion of the Federal Oil Conservation Board, if followed by a corresponding reduction in crude producing and transporting operations, a practical means of relieving the situation which has resulted from the overproduction of crude and gasoline by the industry as a whole. The suggestion of the board relates only to production of gasoline. It is obvious, however, that if refinery operations are decreased the volume of raw material must of necessity be decreased in like proportion, as otherwise the waste which the Conservation Board is seeking to avoid would merely be transferred from storage stocks of gasoline to storage stocks of crude."

CREVELING SAWED HIS WAY THROUGH COLLEGE

(Continued from Page 57)

after the boat had left the dock in New York all objects within the range of his vision began to whirl and dance and he was gripped by a nausea that removed all his interest in earthly things. Such unsteady powers of intellect and will as remained were absorbed in a deep yearning to be conveyed without any exertion on his own part to some secluded spot where he might pass out. With the help of kind hands he managed to reach his stateroom, where he spent most of the trip across the Atlantic in abysmal misery. On the Mediterranean Sea itself Mr. Creveling had no return of seasickness. He saw thousands of interesting things, but he declares that the most delightful and inspiring sight that met his vision on the entire trip was the Statue of Liberty—on the way back.

"Man, this is a wonderful country to live in," exclaimed Mr. Creveling, "Every citizen of the United States ought to take a trip abroad, whether he can afford it or not, just so he can really appreciate the blessings of being an American."

Mr. Creveling served as president of the Natural Gas Association of America in 1923. He is at present a member of the board of directors of the American Gas Association besides being on the executive committee of the Natural Gas Department of that organization.

WESTERN REFINERS MEET IN SHREVEPORT

(Continued from Page 53)

most important discussions ever presented at a meeting of the association.

The meeting will be thrown open for general discussion following the president's address. Another feature of this meeting will be an address by Houston Dunn, secretary and treasurer of the National Petroleum Mutual Fire Insurance Co.

Monday evening the executives will be guests of the Louisiana-Arkansas Refiners Association at a dinner.

Manufacturers Meeting

Tuesday and Wednesday will be given over to the meeting of the manufacturers committee, of which L. R. Crawford, president of the Producers & Refiners Corp., is chairman. A large attendance of managers, superintendents, engineers and others connected with the practical phases of refinery operation is assured for these meetings. Opportunity for the discussion of all papers will be given. Arrangements have also been made for visits to the refinery of the Louisiana Oil Refining Corp.

Those attending the meetings will be the guests of the Louisiana and Arkansas refiners at an entertainment to be given Tuesday night at the Washington-Youree Hotel.

Train schedules have been worked out between the principal refining centers and Shreveport and where possible special accommodations have been arranged. Special coaches will leave Tulsa at 7:05 p.m. Sunday on the Frisco Railroad. The train connects with the Kansas City Southern Railroad, arriving at Shreveport 10 a.m. Monday.

PLAN TO DISPOSE OF SALT WATER BY SEEPAGE

(Continued from Page 56)

ders from the railroad locomotive accumulate inside of this pipe in transit and it is therefore necessary to clean it before it is given the first dip in the primer. This cleaning is done by a man with a wire brush who crawls through each joint of pipe.

The dipping plant is served by a spur from the Santa Fe Railway and the cars are run in on it and the pipe unloaded and stacked by a crane. In handling the pipe around the yard mud has found its way into the inside of some joints and this also is brushed out when the pipe is cleaned.

Crane Handles Pipe Again

The first coating operation is performed at the end of the yard near the stock pile of pipe. The crane that unloads the cars handles this pipe a second time, picking up one joint at a time and lowering it into a U-shaped vat about 45 feet long and 3 feet wide at the top. This vat has from 6 to 7 inches of biturine enamel primer in it. By lowering and picking up each joint several times the coating is applied to both inside and outside quite evenly.

After the joint has been completely rolled around in the vat once it is picked up clear of the dipping tank and a man pulls one end of the joint down so that most of the primer inside the pipe will drain out in from five to six minutes. The pipe then is transferred to the skids that lead toward the hot dip vat the other side of the yard. The skid holds 126 joints of this pipe and it has been the practice to run the primer vat about 24 hours ahead of the hot dip vat so that each joint of pipe will have a full day and night in which to dry on the skids.

The pipe coated with the primer is rolled along the skids to the hot dip vat, where a second crane lifts a joint at a time and dips it into the biturine enamel vat, which is also about 45 feet long and U-shaped. This vat is somewhat deeper than the primer vat and is about 3 feet wide at the top and approximately 3 feet deep.

Pipe Sinks Slowly

The pipe is completely submerged in the hot enamel and it has been noted that it does not sink immediately, as might be expected when it is remembered that each joint weighs about 1,400 pounds, but instead it settles gradually into the hot liquor as the air within the pipe is expelled and the last of this air leaves the pipe with a rush that causes a bubbling of the liquid at each end of the pipe as it fully submerges.

This pipe is left in the vat a short time and the enamel is kept at a constant temperature of about 400° Fahrenheit. The heat is applied by means of a gas flame under the full length of the vat, but the bare flame is not permitted to come in direct contact with the bottom of the vat. A series of baffles interposed between the flame and tank serves to spread the flame as well as protect the vat bottom.

Each joint of pipe requires approximately 280 pounds of biturine enamel to coat it and the vat holds about 18,000 pounds. The new supply is taken from a hot kettle mounted upon a platform at one end of the vat where the enamel is preheated and discharged into the main vat as needed.

The enamel is prevented from coking on the bottom of the vat by the mixing action set up by lowering the pipe into and withdrawing it from the liquid.

It has been observed that the slow sinking of the pipe into this hot liquid tends to cause it to flow up and around the pipe and when the joint is lifted out the enamel will again flow freely. This continued mixing has been beneficial and has kept the biturine enamel in first-class condition at all times. The coating, which is about three-thirty-seconds-inch thick, has a good texture and is quite glossy and evenly applied when the enamel has dried.

To dry this enamel it is necessary to set the pipe upon two pairs of 8-inch diameter steel rollers mounted so that the pipe will rest upon them at a point that corresponds to the place where the victaulic pipe couplings are placed when the pipe is assembled in the field.

The pipe is rolled on these rollers by manual labor and it has been found that the enamel coating will be removed from that portion of the pipe resting upon the rollers which leaves it bare for receiving the victaulic couplings later. Some of the material will adhere to the pipe and that is scraped away by one of the men.

This rolling of the pipe while the enamel is setting tends to create a flow of the hot material around the pipe on the inside and outside and gives an even coating. This is helped by brushing spots as needed. The time required for drying depends upon the atmospheric conditions and the direction of the wind. If the wind blows through the pipe the inside will set quickly otherwise it may take several hours to cool. It has been noted that the enamel hardens more quickly at night than during the day.

The hot dip plant is operated 24 hours each day. Illumination is provided at night by a system of floodlights mounted upon telephone poles at convenient points around the plant. Everything is in the open and the plant must be shut down if it is raining for the water causes the hot dip to foam and makes it impracticable to operate.

From three to four joints per hour are coated in the hot dip vat and after it has had its preliminary set on the rollers the crane again moves it to the loading and storage rack from which it is rolled into the trucks that deliver it to location in the field.

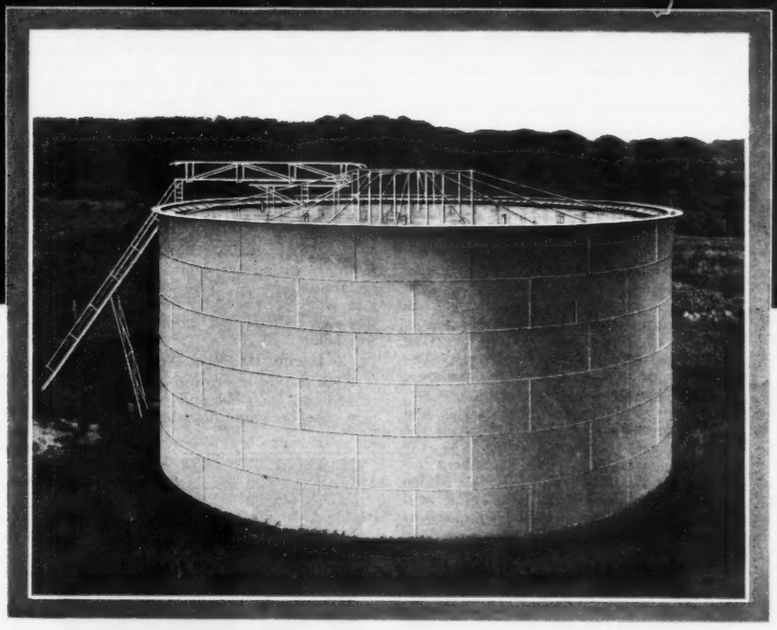
It is understood that plants of the same open air type have been used in California, but this is the first installation of the kind in the Mid-Continent territory, and the success attained indicates that this system will probably be used on other jobs where inside and outside coating of pipe is necessary.

The pipe is being strung and laid at the rate of about 3,100 feet per day for the 20-inch line and about 10 men are needed for that work.

The plant was put into operation the latter part of January and the coating of the 20-inch pipe is now about complete, but the 16 and 12-inch gathering line pipe is still to be coated so the plant will be in operation for several weeks yet.

After the job is finished a great deal of the equipment can be salvaged which adds to the advantages gained by this method of pipe coating.

Columbian Floating Roofs
On KIRK-MORROW TANKAGE



THE Kirk-Morrow Iron Works Company, largest fabricator and erector of steel tankage located in the Mid-Continent Field, is now licensed to manufacture, sell and install the Columbian Steel Tank Company's Floating Roof. By floating on the oil, this roof leaves no space for the formation of combustible vapors, thereby eliminating the fire hazard and loss by evaporation.

KM CO., in selecting Columbian's Floating Roof for KM CO. Tankage, exercised the same careful judgment that has distinguished its personnel in meeting the needs of the oil industry for over twenty-five years. KM CO. is now prepared to offer steel tanks of from 500 barrel to 120,000 barrel capacity, either in standard design or equipped with the Columbian Floating Roof.

Also Furnish Tanks Built In Accordance With A.P.I. Specifications

PRODUCTS

Steel Derricks, Rig Irons, Bull Wheels, Calf Wheels, Band Wheels, Crown Blocks, Tug Wheels, Sand Reels, Steel Tankage, Floating Roofs, Tank Fittings, Refinery Equipment, Steel Plate Construction.

THE KIRK-MORROW IRON WORKS COMPANY

Sales Offices: Hunt Bldg., Tulsa, Okla.; Magnolia Bldg., Dallas, Texas; Central Bldg., Wichita, Kan.

Flood-Water Purification Problems

Removal of Suspended Matter from Intake Water Vital to Success of Flooding Operations. Battling Corrosion

By A. S. Behrman
Chemical Director, International Filter Co., Chicago*

A water that is satisfactory for one purpose or industry is not necessarily suitable for another. Calcium sulphate (gypsum) in water is highly objectionable in boiler plant operation because of the hard scale it produces; but the same calcium sulphate is highly desirable in a water used for baking or brewing, because it is a decided aid to yeast fermentation. Free sodium bicarbonate or carbonate in a boiler water assists in the prevention of scale; but the same substances are very objectionable in the manufacture of ice, and for many bottled beverages.

It follows that water purification problems in different industries vary widely, and that the type of water purification process most advantageously employed is determined by an analysis of the requirements of a satisfactory water for that industry and by the character of the raw water available.

Water for Flooding Operations

A year ago the quality of a water used for flooding operations was given little thought, and purification of such water was practically unknown. Today, producers are keenly alive to the importance of a satisfactory flooding water, and are vitally interested in methods of correcting any undesirable characteristics which their available water supplies may possess.

It is the water, after all, that is directly responsible for the displacement of the oil from the oil-bearing sand; and it is becoming increasingly evident that the quality of the water may have a most important bearing on the effectiveness of this displacement, and consquently on the production of oil.

The requirements of a satisfactory water for flooding operations may be summed up in one brief sentence: The water must not cause plugging up or choking of the oil sand.

With corresponding brevity, we may say that the primary purpose of any water purification for flooding operations is the removal from the raw water of any substance or property which would tend to make it plug the sand and so impede the flow of water and the production of oil.

The principal and most obviously objectionable substance in the raw water is suspended matter. This suspended matter may be present originally in the raw water as such, or it may form only after the water has come in contact with the air or some other substance.

Practically all surface waters—such as rivers and lakes—contain appreciable and sometimes considerable amounts of suspended matter in the form of clay, silt and sand. Many ground waters—such as from wells and springs—have the same characteristic, though usually to a smaller degree. In regions of fissured geological formations, or where mining, drilling or other operations have provided the proper conditions, many ground waters may be quite free from suspended matter during certain periods of the year, while in others—as during or after heavy rains—the amount of suspended matter may be very noticeable.

Removal of Suspended Matter

The removal of this suspended matter is usually relatively simple, and is accomplished with a sand filter. By means of a coagulant, such as alum, the finely divided suspended matter is collected into particles large enough to be held on top of the sand bed, while the now clarified water passes through. When the accumulation of coagulated suspended matter on top of the bed reaches a point where it offers too great a resistance to the passage of water through the bed, the filter is "backwashed"—that is, the flow of water is reversed, the filter sand thoroughly stirred up and loosened, and the accumulation of suspended matter washed away to waste. When the backwash water clears up, the flow of water is again reversed, after which the filter is again ready for operation.

Iron in Flood Water

Iron is found in considerable amount in many well and spring waters in the Bradford Field. Such waters may be quite clear when first pumped or drawn, but on standing in contact with air rapidly acquire a milky appearance, gradually giving way to a rusty brown color. On standing several hours or more, a reddish brown sediment usually settles to the bottom.

From the chemical standpoint, this development is quite simple. The iron originally present is in true solution in the water in the ferrous condition. When the water is exposed to the air, the ferrous iron compounds are oxidized by the oxygen of the air to ferric hydroxide, which is insoluble, and which forms the reddish brown sediment referred to above.

The ferric hydroxide thus formed is jelly-like and quite voluminous. If present in sufficient quantities in a water, it acts as its own coagulent; and it is this property which makes it so disastrously effective in filling the pores in the oil sand, thus shutting off the flow of flood water.

Removal of Iron

The property of the iron in water of forming an insoluble sediment on contact with air suggests the most common method for removing the iron. The water is aerated, and the ferric hydroxide thus formed is removed by sand filtration. When there is enough iron present, and when there is ample time for the ferric hydroxide to settle, no alum or other coagulant need be employed with the filter. With relatively small amounts of iron, and when a pressure filter is used without preliminary sedimentation, alum is generally employed to assist coagulation and thus prevent finely divided particles of iron hydroxide from going through the filter.

Necessity for Filtration

The necessity for the removal of suspended matter from flooding water will be at once apparent on considering how quickly a sand filter used for this removal becomes clogged with the suspended matter and has to be backwashed to restore the normal flow of water through it.

It is common practice to backwash sand filters when the pressure loss through them reaches 4 or 5 pounds. In the Bradford Field this condition is typically reached in about 24 hours continuous operation of the filter.

If we assume, for convenience in our calculation, a pressure loss of 5 pounds in 24 hours, and if we assume that, if the filter was not backwashed, the loss in pressure would continue to mount at the same rate, the loss of pressure at the end of a year of 365 days would reach the rather staggering total of 1,825 pounds—in other words, this much pressure would be required to force any water through the filter bed.

Oil Sand a Very Fine Filter

To the layman who sees a core of typical Bradford sand for the first time, the wonder is that anyone should even consider the possibility of forcing water through such solid rock. As a matter of fact, the Bradford sand is a remarkably fine filter, with such minute pores that even extremely fine particles of sediment will lodge in them and gradually stop the entrance of flood water to the sand. It is this extremely close texture of the oil sand that makes it imperative to remove suspended matter from the flood water by an external and washable filter, rather than to let the oil sand itself perform the filtration with all too perfect completeness.

Paul D. Torrey, the eminent authority on the geology of the Bradford Field, informs me that the largest sand particles in typical Bradford sand are about 0.008 inch in diameter; and that from this high value the size of the particles ranges down to as low, in some cases, as 100 and 200 mesh.

It is interesting to compare these sizes with the average grading of filter sand used for potable and industrial filter installations. The effective size of typical filter sands ranges from about 0.35 millimeter (0.014 inch) to 0.60 millimeter (0.024 inch)—that is, 90 per cent of the sand is coarser than the effective size, with some of the 90 per cent usually considerably coarser.

If the grains of sand composing a filter bed are assumed to be perfect spheres of uniform size, it can be shown mathematically that the voids—that is the "porosity"—amount to about a third. It can be shown also that the greatest diameter of particle that can slip into the voids between the sand grains is

*Read before a meeting of the Northwestern Pennsylvania Oil Producers Association Bradford, Pa., January 24, 1930.

TAUBMAN SUPPLY CORP. BECOMES DISTRIBUTOR FOR CHAPMAN VALVE

The Taubman Supply Corp., Tulsa, which has experienced steady growth since it was established 10 years ago, has expanded its field by becoming distributor for the Chapman Valve Manufacturing Co. in the Mid-Continent territory. The business of the Taubman organization, hitherto confined to pipe, will now embrace the full line of brass, iron and steel gate valves for every branch of the oil and gas industry produced by the Chapman company. The Taubman offices will continue to be in the Midco Building, Tulsa, but in addition it will maintain warehouse and display rooms at 115 West First Street. Enlargement of warehouse and office facilities are contemplated. In addition to branch offices already established in Wichita, Kans.; Borger and Wink, Tex.; and Oklahoma City, Seminole and Maud, Okla., the company is opening new branches in Konowa, Okla., and McPherson, Kans.

Dealing solely in used pipe when it began, the Taubman organization has enlarged its activities so that now this part of its business occupies a secondary place. The total annual business, which at first was barely $50,000, has grown to about $4,000,000, new pipe representing approximately $2,500,000 and used pipe $1,500,000.

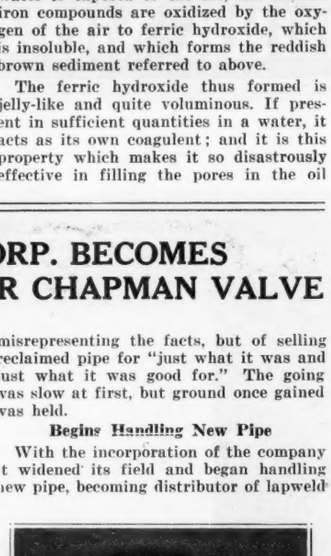
Mr. Taubman Active Head

Herman P. Taubman, active head of the concern, came to the United States from Russia, his native land, at the age of 17 in 1910. Unable to speak English, he set about to master the language and the customs of his adopted country. With enough financial help from relatives to get a start he conducted a wholesale produce business in St. Joseph, Mo., for a time and then going to Joplin, Mo., he began buying and selling mining supplies. Notwithstanding the handicap under which he worked, he made steady progress. He had applied for naturalization papers upon arriving in this country and while he was in Joplin in 1917 he attained full American citizenship.

In 1920 Mr. Taubman, discerning opportunity in the spreading oil fields of Oklahoma, went to Tulsa and as the H. P. Taubman Supply Co. entered the business of buying and reclaiming pipe in abandoned oil leases and pipe lines, and then reselling it. In 1925 the Taubman Supply Corp. was incorporated under the laws of Oklahoma with a capitalization of $250,000. When Mr. Taubman had begun dealing in used pipe many irresponsible persons were in the same business and he found himself encountering suspicion and distrust in some quarters. He held unswervingly to the plan of never misrepresenting the facts, but of selling reclaimed pipe for "just what it was and just what it was good for." The going was slow at first, but ground once gained was held.

Begins Handling New Pipe

With the incorporation of the company it widened its field and began handling new pipe, becoming distributor of lapweld



Herman P. Taubman

pipe of the Central Tube Co., Pittsburgh, Pa. Another forward step was taken in 1929 when the company became distributor also for seamless casing of the Pittsburgh Steel Products Co. Less than a year later the company now extends its field still further by taking over distribution of the Chapman Valve products.

In 1926-27 Mr. Taubman stirred wide interest by waging a campaign against the practice of certain jobbers who, he said, bought "mill seconds" and then sold them as "mill surplus" at extremely low prices to men in the oil and gas industry who believed they were getting regular grades of pipe. According to Mr. Taubman, pipe that was burned, split, porous or defective in other way was glossed over so that its defects were not apparent. He appealed to the Federal Trade Commission and his efforts are said to have resulted in virtual abandonment of the traffic in "mill surplus."

about 1.45 times the diameter of the grains.

The practical significance of the above discussion is this: If a typical sand filter with these characteristics clogs up so rapidly that it must be washed about once every 24 hours, how much more quickly will the much more finely grained oil sand become filled and choked!

Another interesting analogy to filter practice may be mentioned. While many waters in the Bradford area are relatively clear, many of them have pronounced turbidities. Let us assume, for the purpose of our discussion, that the water has a low turbidity caused by the presence of 10 parts per million (0.6 grains per gallon) of suspended matter. Let us assume that this water, unfiltered, is delivered to a water intake well at the rate of 2,000 gallons (about 50 bbls.) per day. If the depth of the oil sand exposed to the action of this water is the typical 40 feet, and if the hole is 12 inches in diameter, then the sand surface exposed to this water would be the area of the side wall of this hollow cylinder, and would amount to about 125 square feet.

At the end of 365 days, the water would have brought into the hole about 62.5 pounds of suspended matter. If we assume that this is distributed evenly over the sand surface exposed, this would amount to a half pound of suspended matter per square foot of sand surface—which would obviously be enough to seal the sand most effectively. Undoubtedly the distribution of the suspended matter is not perfectly uniform; but the assumption illustrates clearly the potential danger of plugging the sand with waters of even very low turbidity.

Filtration as Insurance

It has already been pointed out that the fact that a water is clear at one season of the year is no assurance that it will remain so throughout the year. This potential danger of unexpected and costly pollution has led to the installation of a number of filters on normally clear waters simply as insurance against such an unwelcome occurrence. Since the cost of installation and operation of a filter is practically negligible when compared to the value of the property it protects, this investment in insurance appears to be amply justified.

Corrosion

A new and hitherto unsuspected source of suspended matter has recently been brought to light. About two months ago we received for examination a small section of steel pipe from a water line to an intake well. With this specimen came the complaint that the pipe seemed to be filling up with a reddish brown sediment apparently brought in from some outside source and deposited in the pipe.

Our examination of the pipe disclosed one of the most perfect and clear-cut cases of tubercular oxidation corrosion that we have ever seen—in other words, the reddish brown deposit was being formed by corrosion of the pipe, and at the expense of the metal itself, rather than being brought in from some outside source. Under each nodule or tubercle was a definite and pronounced pit, typical of cases of corrosion of this kind.

Several well-formed nodules were examined under the microscope, and were found to portray beautifully the progress of the corrosion of the steel. Nearest to the metal surface the honeycomb structure consisted of bluish-green ferrous iron compounds; while furthest away from the metal, and in contact with the water and its dissolved oxygen, the nodule was composed entirely of reddish brown ferric hydroxide. Chemical analysis confirmed the findings of the microscopic examination.

Obviously, this discovery of the corrosion suggested two unpleasant possible consequences: (1) The useful life of the pipe would be greatly shortened; and, (2) much more important, the reddish brown sediment of ferric hydroxide, formed as a result of the corrosion, would be carried to the oil sand and choke it.

From information obtained at Bradford it would seem that corrosion is a more common source of trouble than has been suspected; and a careful survey of the situation would probably reveal the fact that sediment formed by corrosion has materially shortened the life of an appreciable number of water intake wells.

A study of the several hundred analyses we have made of waters in the Bradford Field and adjacent territory reveals the interesting information that while the majority of waters in the Bradford district proper would not be expected to be particularly corrosive, there are a few exceptions to this rule; while in the adjacent counties in New York, several of the water supplies examined should be definitely dangerous in this respect.

The corrosive tendencies of water—and this applies particularly to oxidation corrosion—may usually be recognized by the low alkalinity and pH of the water. Without going into a detailed discussion of pH, it may be said that pH bears the same relation to total alkalinity (or total acidity) as does temperature to heat. Just as temperature is a measure of the intensity of heat, so pH is a measure of the intensity or activity of alkalinity (or acidity).

Neutrality is represented by pH 7.0. Alkaline solutions have a pH higher than 7.0, acid solutions lower than 7.0. The higher the pH, the more intense is the alkalinity; and the lower the pH, the more intense is the acidity.

Near Olean, N. Y., there is a spring water with a total alkalinity of 3 parts per million and pH of 5.9. Analysis of another water supply shows a total alkalinity of 7 parts per million and pH of 5.8. Both of these waters, if they contain dissolved oxygen, will be very definitely corrosive to steel pipe.

Prevention of Corrosion

There are two ways of avoiding corrosion of water lines. One is to use a noncorrodible pipe. The other is to put the water in such condition that it will not corrode. The choice between these two remedies is essentially an economic one, in which the increased cost of the special resistant pipe is balanced against the cost of water treatment.

Because of the very unusual conditions involved, we have suggested that field tests should be made of any special pipe that is proposed for this work. In addition to at least one such field test that is now being carried out, accelerated corrosion tests are being made in our laboratory that should throw definite light on this point.

According to Baylis,[1] the only permanently satisfactory method of preventing oxygen corrosion or iron and steel water piping is to maintain the water in such condition that a thin protective coating of calcium carbonate is deposited upon it, thus preventing contact of the iron with the oxygen. This is accomplished by building up the alkalinity and pH of the water to the proper point by means of the addition of an alkali.

The method is used now quite extensively in preventing the corrosion of city water mains and distribution systems. The same general principle has application to flood water lines, but must be used with care, due to the special problems involved.

Another more or less obvious way of preventing corrosion by dissolved oxygen is to keep the water oxygen-free. This again involves several interesting chemical problems which cannot be discussed here in the detail which would be required for proper treatment.

Other Causes of Corrosion

While corrosion of steel pipe by dissolved oxygen is the type of most importance in the Bradford area, it is not the only kind that may cause difficulty. Highly acid waters—as from coal mines—or electrolytic action, may likewise be sources of trouble; but a survey of the Bradford situation indicates that these possibilities are of very minor, if not negligible importance.

Increasing the Efficiency of Flood Water

In the November 21, 1929, issue of The Oil and Gas Journal, P. G. Nutting suggested the use of sodium carbonate in flood water to facilitate the removal of oil from the pores of the sand. According to reports received at Bradford, the method was tried out on several leases, but with little success—in fact, the shortened life of several water intake wells was attributed to its use.

This result is not difficult to explain. Torrey[2] has shown that connate water is essentially concentrated sea water, and that the oil sand is loaded with crystallized salts deposited during the concentration.

While we usually think of sea water as being particularly rich in common salt (sodium chloride) it contains in addition a large amount of calcium and magnesium salts.

When a solution of calcium chloride or sulphate is treated with a solution of sodium carbonate, a heavy precipitate of calcium carbonate (limestone) results. This reaction is used effectively in water softening by the lime-soda process, in which the so-called "permanent hardness" (due to calcium and magnesium chlorides and sulphates) is precipitated with soda ash.

It is not surprising therefore that when a solution of sodium carbonate is introduced into an oil sand bed, laden with calcium and magnesium salts, the precipitate formed should rather quickly fill the pores of the sand and stop the further flow of the water.

It seems to me that Doctor Nutting's idea is basically a most excellent one, but that the reagent he employed happens to be unsuited to the peculiar requirements of the situation. What is ideally required, of course, is something that will make the water wet the sand more readily than the oil does, and without the formation of a precipitate that will clog the pores. The problem is thus essentially one of adjustment of surface tension conditions in the system; and it would not be at all surprising to see a solution of the problem worked out from purely theoretical physical chemical considerations.

Conclusion

It has been possible in this paper to discuss only in a broad way the major problems of water purification in flooding operations. There are a number of special problems, and special methods of treatment that would require more time than is available for adequate discussion.

Not all waters require treatment, nor is the same kind of treatment applicable in all cases; but the quality of the flooding water is of sufficient importance to the producer to warrant his giving careful consideration to what may prove to be one of the major factors in his oil production.

[1]Industrial and Engineering Chemistry, July, 1927.

[2]Technical Pu'lication No. 38, Amer. Inst. Min. & Met. Eng., Dec., 1927.

VACUUM OIL COMPANY EXPLAINS THE MERGER

(Continued from Page 245)

they are familiar, thereby ensuring that the distinctive Vacuum products will be available exactly as heretofore. The customers of the Standard Oil Co. of New York can likewise feel assured that they will be dealing with the same management and personnel with which they are familiar in the marketing of the distinctive Standard Oil Co. of New York products.

Shell Union Oil

Shell Union Oil Corp. declared regular quarterly dividends of 35 cents on common, payable March 31 to stock of record March 6, and $1.37½ on perferred, payable April 1 to stock of record March 10.

Shell Transport

Underwriting is being arranged for issue of £5,000,000 Shell Transport & Trading Co., Ltd., 7 per cent second preference shares. It is understood the issue will be made next week at a price yielding £5 12 shillings.

The Texas Corp.

The Texas Corp. declared the regular quarterly dividend of 75 cents, payable April 1 to stock of record March 7.

New Jersey Stockholders

During the period from August 15, 1929, to December 16, 1929, number of stockholders of the Standard Oil Co. of New Jersey increased to 93,659 from 78,804. This represents an increase of nearly 20 per cent.

Root Refining

Root Refining Co. reports for year ended December 31, 1929, net profit of $500,258 after federal taxes and all charges, equivalent after dividends on no-par shares of $1.80 convertible prior preference and $3 convertible preferred stocks, to $3.27 a share on 103,000 no-par shares of common stock. In 1928 net profit of predecessor company was $528,326, or $3.56 a share on 102,000 common shares then outstanding.

Phillips Petroleum

Report of Phillips Petroleum Co. for year ended December 31, 1929, shows net profit of $13,212,591 after taxes, interest, depreciation, depletion, intangible drilling costs, etc., equivalent to $5.39 a share on 2,450,430 average no-par shares of stock outstanding during the year and to $5.19 a share on 2,543,306 shares outstanding at end of year. This compares with $5,960,171 or $2.48 a share on 2,402,354 shares in 1928.

Phillips Petroleum Co. declared the regular quarterly cash dividend of 50 cents, payable April 1 to stock of record March 14. In November last year the stock was placed on $2 annual cash dividend basis, compared with $1.50 previously, a stock dividend of 5 per cent also being declared.

The company states, however, that directors believe that on account of the recent downward adjustment in prices of petroleum and its products it is too early in the year to estimate earnings and therefore consideration of a stock dividend at this time was deferred.

Honolulu Consolidated

Honolulu Consolidated Oil Co. reports for year ended December 31, 1929, net profit of $2,200,762 after depletion, depreciation, federal taxes and intangible drilling costs, equal to $2.31 a share on 944,900 common shares. This compares with $2,351,348 or $2.49 a share in 1928 and $3,163,495 or $3.35 a share in 1927.

The Texas Company

The annual report of The Texas Company and subsidiaries for the year 1929, which will be mailed about March 15, will show, after all deductions for federal taxes and reserves, net earnings of $48,318,072 available for dividends and surplus. This is equivalent to $5.12 a share on the average number of shares outstanding during the year and compares with $45,073,880, or $5.56 a share, earned on average stock in the year 1928.

The average number of shares of The Texas Company stock outstanding during the year totaled 9,433,164, while at the end of the year there were 9,850,050 shares outstanding. In 1928 the average number was 8,107,763 shares, with 8,443,250 outstanding at the close of that year.

Continental Oil

Continental Oil Co., including subsidiaries, reports 1929 net profit of $9,028,660, equal to $1.90 a share on 4,743,103 no-par shares of capital stock which will be outstanding when all Continental Oil Co. of Maine shares have been exchanged. This compares with net loss of $4,987,564 in 1928. Continental Oil Co. of Maine and Marland Oil Co., constituting the present Continental Oil Co., were consolidated July 1, 1929, and earnings given in annual report represent operations of Marland Oil for entire year 1929 and operations of properties formerly owned by Continental Oil of Maine for last six months of 1929 only. Figures for 1928 represent results from operations of Marland Oil alone. Net profits of Continental Oil of Maine in first six months of 1929, amounting to $1,058,419, are not included as income in this report, but were taken over as assets.

Oklahoma Natural Gas

Gross earnings of $10,977,270 are reported for 1929 by the Oklahoma Natural Gas Corp., against $10,096,715 the year before. Net operating income, after expenses and taxes, was $4,680,050, against $4,004,069.

United Carbon

United Carbon Co. declared a dividend of 50 cents on the common, payable April 1 to stock of record March 15. Dividends on this stock were initiated with the payment of 50 cents on January 1,

this year. The regular semiannual dividend of $3.50 was also declared on the preferred. At the annual meeting Colonel Grayson M. P. Murphy was elected a director, replacing C. F. Clay, who resigned. Other directors were re-elected.

Houston Oil

Consolidated statement of Houston Oil Co. of Texas and Houston Pipe Line Co. for year ended December 31, 1929, shows net profit of $1,755,232 after depreciation, depletion, federal taxes, etc., equivalent after 6 per cent preferred dividends, to $4.87 a share on 250,000 shares of common stock. This compares with $1,812,517, or $5.11 a share, on 249,686 common shares in 1928.

Peoples Gas

George F. Mitchell, who has been vice president in charge of finance yesterday assumed the presidency of the Peoples Gas Light & Coke Co., a position which Samuel Insull has held since 1919. Mr. Insull retires from the presidency to become chairman of the board, while his son, Samuel, Jr., is made vice chairman.

Standard Oil of Kentucky

Standard Oil Co. of Kentucky declared the regular quarterly dividend of 40 cents, payable March 31 to stock of record March 15.

Twenty Representative Stocks

The Oil and Gas Journal's weekly average price of 20 representative petroleum stocks listed on the New York Stock Exchange and New York Curb, based on closing quotations for Saturday, was as follows:

Sept 7	59.16	Dec. 4	50.60
Sept. 14	60.40	Dec. 11	50.51
Sept. 21	57.93	Dec. 18	49.24
Sept. 28	58.63	Dec. 24	47.36
Oct. 5	57.00	Dec. 31	48.86
Oct. 12	59.75	Jan. 8	48.56
Oct. 19	58.70	Jan. 15	48.38
Oct. 26	54.59	Jan. 22	47.13
Oct. 31	42.29	Jan. 29	47.46
Nov. 8	48.31	Feb. 5	48.13
Nov. 15	47.61	Feb. 12	47.49
Nov. 22	47.76	Feb. 19	45.85
Nov. 29	48.60	Feb. 26	46.71

CALIFORNIA CURTAILMENT SCHEDULE

California curtailment schedule for February, 1930, based on findings of the advisory committee follows:

	Estimated potential	Present prod.	Present B/D	Curtailment %	Proposed B/D	Curtailment %	Current allowable
Group 1—							
Santa Fe Springs	262,284	165,000	97,284	37.08	112,782	43.00	149,502
Long Beach	156,880	105,000	51,880	33.09	67,458	43.00	89,422
Ventura Avenue	74,170	50,000	24,170	32.60	31,893	43.00	42,277
Elwood	64,579	33,000	31,579	48.90	27,769	43.00	36,810
Seal Beach-Alamitos	41,053	37,000	4,053	9.87	17,653	43.00	23,400
Kern Front	22,600	20,100	2,500	11.06	9,718	43.00	12,882
Mount Poso	17,600	14,750	2,850	16.18	7,568	43.00	10,032
Round Mountain	5,800	3,550	2,250	61.22	2,494	43.00	3,306
Maricopa Flats	20,000	20,000	.....	.....	8,600	43.00	11,400
Group 1 total	664,966	448,400	216,566	32.56	285,935	43.00	379,031
Group 2—							
Fullerton-Brea	22,450	13,750	8,700	38.75	8,980	40.00	13,470
Whittier	1,475	1,475	.....	.....	.....	.....	1,475
Montebello	8,700	8,700	.....	.....	2,000	23.00	6,700
Coyote	13,545	11,500	2,045	15.10	3,045	22.45	10,500
Richfield	14,600	14,600	.....	.....	5,800	40.00	8,800
Huntington Beach	41,250	41,250	.....	.....	16,000	38.82	25,250
Torrance	12,600	12,600	.....	.....	.....	.....	12,600
Dominguez	15,800	10,700	5,100	20.48	6,320	40.00	9,480
Rosecrans	6,500	6,500	.....	.....	.....	.....	6,500
Inglewood	23,500	22,100	1,400	59.60	4,700	20.00	18,800
Potrero	900	900	.....	.....	.....	.....	900
Lawndale	700	700	.....	.....	.....	.....	700
Los Angeles-Salt Lake	1,600	1,600	.....	.....	.....	.....	1,600
Newport	30	30	.....	.....	.....	.....	30
Playa Del Rey	1,900	.....	1,900	100.00	1,900	100.00	.....
Kern River	11,840	2,500	9,340	78.89	9,340	78.89	2,500
Fruitvale	5,500	3,100	2,400	43.60	2,400	43.60	3,100
McKittrick	4,800	4,800	.....	.....	960	20.00	3,840
Lost Hills-Belridge	8,630	5,375	3,255	37.73	6,540	75.80	2,090
Midway-Sunset	85,340	61,500	23,840	27.95	34,136	40.00	51,204
Elk Hills	29,320	16,600	12,720	43.38	12,720	43.38	16,600
Wheeler Ridge	620	620	.....	.....	.....	.....	620
Coalinga	33,190	9,300	23,890	71.98	23,890	71.98	9,300
Santa Maria	10,195	2,850	7,345	72.10	9,145	89.75	1,050
Rincon	3,650	3,650	.....	.....	.....	.....	3,650
Ventura-Newhall	5,770	5,050	720	12.48	720	12.45	5,050
Capitan	400	85	315	78.80	315	78.80	85
Summerland	450	450	.....	.....	.....	.....	450
Santa Barbara	100	55	45	45.00	45	45.00	55
Watsonville	65	65	.....	.....	.....	.....	65
Group 2 total	365,420	262,405	103,015	28.10	148,956	40.76	216,464
Group 3—							
Kettleman Hills	65,000	13,500	51,500	79.23	51,500	79.23	13,500
Grand total	1,095,386	724,305	371,081	33.88	486,391	44.40	608,995

COMPANY WIDENS MARKET FOR SPECIALTY PRODUCT

(Continued from Page 237)

a separate division within itself for the marketing of this product.

"Demonstrations in the home are made by means of a small-size working model of the Standard installation, including a hot plate to which the gas tanks are connected.

"The simple Standard Flamo installation, generally made by our package truck drivers, consists of an attractive metal cabinet in which are housed two portable cylinders connected with each other and, by standard piping, to the gas range or other gas appliance. A pressure regulator is provided to maintain a steady flow of gas to the burner and a valve between the tanks enables the housewife to switch to the full tank when one becomes empty. A phone call to the Standard Oil Co. will effect a replacement of the empty tank long before the other one may be exhausted.

"Each cylinder contains enough Standard Flamo liquid for approximately 300 burner hours and has approximately five times the heat value per cubic foot of 'manufactured gas.' One cylinder will care for the average family cooking, when used economically, for from five to eight weeks, depending on the type of appliance in use and at a cost of about 2½ cents per burner hour."

CHICAGO POST OFFICE BIDS LITTLE CHANGED

(Continued from Page 238)

for shipments during the following week. The Shaffer Oil & Refining Co. made a bid of .0615 cents for the first, .0640 cents for the second month and .0690 cents for the third month but did not make a differential bid based on the tank car market date of shipment.

Tank Wagon Bids

The tank wagon bids were as follows: Standard Oil Co. of Indiana bid 11 cents or 3 cents below the normal tank wagon market date of delivery. The Shaffer Oil & Refining Co. bid 10 cents the first month and 11 cents for the second and third month with a maximum of 11 cents. The Continental Oil Co. made a flat price of 14 cents or with a maximum of 14 cents. The Apex Motor Fuel Co. bid .08575 cents with no maximum.

In each case where the tank car bids were made a charge is to be added for handling amounting usually to a half-cent a gallon. The successful bidder in the case of a tank car bid is to take the gasoline into its own storage and deliver to the department's truck as required. The specifications call for Oklahoma gasoline as the Government will be able to secure the land grant rate of freight for shipments from that State.

CHAIRMAN H. M. DAWES APPOINTS COMMITTEES

(Continued from Page 238)

with L. S. Westcoat, the Pure Oil Co., Chicago, as chairman of the committee.

H. H. Fuller, Sinclair Refining Co., New York, is chairman of the committee for the Northeastern region, which includes Maine, New Hampshire, Vermont, Rhode Island, Connecticut, New York and Massachusetts. C. G. Sheffield, Standard Oil Co. of New Jersey, New York, heads the group for the Eastern region, made up of Virginia, Pennsylvania, Delaware, New Jersey, Maryland, District of Columbia, North Carolina, South Carolina and West Virginia. W. G. Violette, Standard Oil Co. of Kentucky, Louisville, Ky., is chairman of the committee for the Southeastern region, which includes Georgia, Florida, Kentucky, Tennessee, Alabama and Mississippi.

These regional committees will cooperate with the state code committees within their limits, and assist them in their work of conciliation and adjustment with respect to the operation of the code.

H. D. Collier of the Standard Oil Co. of California, San Francisco, has been appointed by President Reeser as a member of the national committee on interpretation of the code. Mr. Collier succeeds E. L. Shea of the Tide Water Associated Oil Co., New York., who resigned.

TO MAKE PIPE LINES PUBLIC UTILITIES

(Continued from Page 57)

between or against its patrons in regard to facilities furnished or service rendered, or rates charged under the same or similar circumstances, in the storage of crude petroleum.

Section 3. Provides that all such public utilities shall file a bond to observe the provisions of this law and the rules of the Railroad Commission.

Section 4. The Railroad Commission of Texas shall establish and enforce rules and regulations governing the character of facilities to be furnished by such utilities, the forms of receipts to be issued by them, the rates, charges and regulations for the storage of crude petroleum by such public utilities in respect to their storage facilities, and for the inspection, grading, measurement, deductions for waste or deterioration, and delivery, of such products, and it shall also exercise such power upon petition of any person showing a substantial interest in the subject matter thereof.

Section 5. Any such public utility shall have a lien on the commodity in its possession to secure it in the payment of all proper storage charges against such commodity, and, or, the transportation charges accrued to or paid or advanced, by it, superior to all other liens thereon.

Must Post Information

Section 6. Every common carrier of crude petroleum within this State, as defined by law, and every public utility, as defined herein, shall on or before the tenth day of each calendar month file with the Railroad Commission of Texas, and post in a conspicuous place, accessible to the general public, in each of its division offices, and in its principal office in this State, a statement, duly verified, containing the following information concerning its business during the preceding calendar month:

1. How much petroleum, crude or refined, was in the actual and immediate custody of such carrier or public utility at the beginning and close of such month, and where same was located or held, including the location and designation of each tank or place of deposit, and the name of its owner;

2. How much petroleum, crude or refined, was received by such carrier or public utility during such month;

3. How much petroleum, crude or refined, was delivered by such carrier or public utility during such month;

4. What quantity of such petroleum, crude or refined, is held by it for the account of itself or parent or affiliated organizations.

5. The available empty storage owned or controlled by it and where located.

Section 7. The Railroad Commission of Texas may, after hearing in a proceeding upon complaint by a party at interest, or upon its own initiative without complaint, and after notice and hearing as provided by Article 6,038, Revised Civil Statutes of Texas, 1925, authorize or require by order any person, association of persons or corporation owning or operating pipe lines in the State of Texas, which is a common carrier as defined by law, or owning, operating or managing any crude petroleum storage tanks, or crude petroleum facilities for the public for hire, to extend or enlarge such pipe lines, or storage facilities, provided such extension or enlargement shall be found to be reasonably required in the public interest and that the expense involved will not impair the ability of such common carrier or public utility to perform its duty to the public.

Common Purchaser

Section 8. Every person, association of persons or corporations, now or hereafter engaged, in the business of purchasing crude oil or petroleum in this State, which is affiliated through stock-ownership, common control, contract or otherwise, with a common carrier by pipe line, as defined by law, or is itself such common carrier, shall be a common purchaser of such crude petroleum and shall purchase without discrimination in favor of one producer or person as against another in the same field, and without unjust or unreasonable discrimination as between fields in this State; the question of justice or reasonableness to be determined by the Railroad Commission,

taking into consideration the production and age of wells in respective fields and all other proper factors. It shall be unlawful for any such common purchaser to discriminate between or against crude oil or petroleum of a similar kind or quality or in favor of its own production, or production in what it may be directly or indirectly interested, either in whole or in part, but, for the purpose of prorating the purchase of crude oil or petroleum to be marketed, such production shall be taken in like manner as that of any other person or producer and shall be taken in the ratable proportion that such production bears to the total production offered for market in such field. The Railroad Commission of Texas shall have authority, however, to relieve any such common purchaser, after due notice and hearing, as herinafter provided, from the duty of purchasing petroleum of inferior quality or grade.

Section 9. The Railroad Commission of Texas shall have authority to make rules and regulations for the enforcement of the provisions of this act.

Section 10. Any person, association of persons or corporation, or the attorney general of Texas on behalf of the State, may institute proceedings before the Railroad Commission, or apply for a hearing before said commission, upon any question relating to the enforcement of this act, and jurisdiction is hereby conferred upon said commission to hear and determine the same. The commission shall not make any order establishing, prescribing or modifying rates, rules or regulations, as herein provided, except upon like notice and hearing.

Penalty

Section 11. For the violation of any provision of this act, or for the violation of any valid rule or regulation promulgated hereunder, or any order passed by the Railroad Commission in pursuance of any such provision, unless stayed by a court of competent jurisdiction, of any rule or regulation, such person shall forfeit as a penalty to the State of Texas for such violation the penalty prescribed in Article 6.047, Revised Civil Statutes of Texas, and each day's violation shall constitute a separate offense, said penalty to be recovered by the attorney general.

Section 12. Any person or party at interest aggrieved by any order of the Railroad Commission of Texas under this act, may have such order reviewed by proceedings in the manner prescribed by Article 6,453, Revised Civil Statutes of Texas. The proceedings upon appeal shall be in like manner as prescribed by Article 6,453.

Section 13. The invalidity of any section of this act, or part thereof, shall not affect the remainder of said act.

Section 14. All laws and parts of laws in conflict herewith are hereby repealed.

Section 15. The fact that the regulatory laws of this State do not now apply to storage facilities or charges, and that no law of this State regulates the business of purchasing crude petroleum, and that there is existing discrimination and a virtual monopoly in such business, constitutes an emergency and an imperative public necessity that the constitutional rule requiring all bills to be read on three several days be suspended, and the same is hereby suspended, and that this act takes effect immediately upon its passage, and it is so enacted.

Against Conservation Change

Earlier last week Governor Moody told a group of operators seeking a unitization or conservation measure, that he would not submit the proposed conservation or proration measure. He said it was in direct opposition to the antitrust laws of the State and that he is not in favor of muzzling that law or interfering with its effectiveness.

W. S. CALVERT DIES

CHATHAM, Ontario, Mar. 1.—William Samuel Calvert, well known in the Canadian oil industry, died recently at Toronto, aged 73. He was at one time president of the Canada Oil Co. and was interested in Canadian producing and refining.

LOWER PRICES ON EXPORT SHIPMENTS

(Continued from Page 52)

factor in the steady price decline in Mid-Continent gasolines which started early in June and continued over the remainder of the year.

In October, however, when the domestic market had declined to the point where prices on the high gravity grades were in line with the export basis, export companies became more active and have made purchases totaling from 12,000,000 to 15,000,000 gallons monthly since that time. These purchases continued in December, January and February, despite the fact that the domestic prices continued to decline so that in January and February material was available from one-fourth to three-fourths cent under the prices being paid on the export contracts.

Independent Buying

It was feared that this disparity would result in lower export prices but no changes were made until last week. After the domestic market slumped below the export basis as established by the export association independent export buying came into the Mid-Continent Field from time to time. While the membership of the Export Petroleum Association, Inc. includes all the major factors in foreign markets, there remain a few smaller concerns which are in a position to buy independently. The few purchases placed with Mid-Continent refiners by these buyers were made through brokers for delivery at a Gulf Coast terminal.

While the quantity of this independent business was not large compared to the regular purchases it is thought that the threat of increasing sales may have been responsible for the action of the export association in reducing prices. With the same line of reasoning it is predicted that export prices will not be advanced to their former levels until the domestic prices have shown substantial improvement.

Domestic Market

The improvement noted last week in the domestic gasoline market has not continued with the start of a new month. Some market observers blame the reduction in export prices for this development. This is hardly a tenable position in view of the fact that the base export prices are still as high as the general domestic market with some material still available at distress prices.

One observer believes that the lowering of the export prices will tend to aid the domestic market. He argues that several refiners have had so much export business at attractive levels that they have not been concerned with the domestic market selling their excess material with little regard to the prices obtained. With the export and domestic prices on a parity he argues that these refiners will be forced to give more attention to the domestic market and restrict their output so that it is more in line with the demand.

Too Much Gasoline

Regardless of the merits of this particular viewpoint there is unanimous agreement that too much gasoline is being refined both in the Mid-Continent and other parts of the United States. Most observers feel there can be no substantial improvement in prices until this condition is remedied by a general curtailment of runs. The weekly figures of the American Petroleum Institute show a consistent increase in gasoline stocks until they have passed the peak point in the history of the refining industry. With at least 60 days still remaining before the demand normally exceeds the refinery supply it is pointed out that if present operations are not curtailed gasoline stocks will become so large that the market will be burdened with excess supplies throughout the remainder of the year. Various curtailment plans have been suggested but there has been no general acceptance of any of them.

Gasoline and Naphtha

Most of the price weakness reported during the past few days has come from areas outside Oklahoma. Sales of specification U. S. Motor gasoline for resale on a basis of 5⅝ cents, Group 3, were reported from several sources on Monday and Tuesday. The general price range on the same product in Oklahoma was 5¾ to 6½ cents, the top price being maintained by most of the larger refiners in the State. The jobber demand apparently was not as active as it was the last week in February.

The price range on the higher gravity grades was unchanged. As previously explained the export prices following the reduction were still as high as the prevailing domestic market. Most refiners are endeavoring to keep their output of the high gravity gasoline in line with the requirements of their export contracts plus their regular domestic trade. This situation has tended to emphasize the importance of U. S. Motor gasoline in the market. The price range on the naphtha grades was not changed during the week.

Kerosene

Kerosene prices have maintained the improvement noted last week and a few refiners who are well sold up have advanced their prices again.

Some sellers in touch with the consuming market state that conditions are not favorable for a large consumption of the kerosene in the agricultural regions. This is due to the competition of gasoline and untreated distillates as tractor fuel.

In the agricultural states gasoline used in farm work is generally exempt from the gasoline tax. Since the recent reductions in gasoline tank wagon and service station prices, the kerosene tank wagon and the net gasoline tank wagon prices are approximately the same. A refiner buying large quantities of gasoline for tractor fuel can generally buy at the tank wagon price so that the cost of the two products is now the same. It is claimed that with such a condition prevailing farmers will use more gasoline this spring.

Another competitor of kerosene are the better grades of distillate. Properly refined these distillates are satisfactory tractor fuels. These distillates are availalbe under the kerosene prices and many tractor operators have stopped using kerosene substituting this product.

Fuel Oil and Gas Oil

Fuel oil, gas oil and distillate can all be placed in the same class so far as the present market is concerned. The higher gravity fuel oils are moving slowly and the same situation obtains in regard to distillate and gas oil. Prices vary widely depending on the position of the individual refiner. A 24-26 gravity fuel oil which was strong at $1 a barrel a few weeks ago sold last week for resale as low as 75 cents. This situation is representative of the high gravity grades. The price range on the lower gravities is being maintained although some off specification material was sold last week as low as 62½ cents.

The spot demand for distillate continues very slow and sales at distress prices were reported. The straw color, low cold test gas oils of low flash are often bringing as much as the 36-38 and 38-40 distillates. The industrial and U.G.I. grades of gas oil have had a fair movement but Oklahoma refiners are feeling the competition of material from West Texas and other areas where lower crude oil prices have apparently increased the supply.

Natural Gasoline

While not as active as they were the latter part of February natural gasoline manufacturers up to Tuesday had not made any important changes in prices in the several grades. There is considerable carry-over business from February and most of the sellers expect that they can maintain last month's advances throughout March. A few at least expect better prices before the end of the month.

Lubricants and Wax

There were more inquiries for wax over the week. It is predicted that more buying will come into the field before the end of the month. One 300-ton order is said to have been placed at 2⅝ cents. This was for the 124-126 grade.

The price ranges on bright stocks, cylinder stocks and neutral oils are unchanged. The spot demand for cylinder stocks is light but the refiners are hopeful that prices can be maintained until the spring and summer demand gets under way.

Test Case on Merger Within 10 Days by Department of Justice

By Charles E. Kern

Washington Bureau, The Oil and Gas Journal

WASHINGTON, D. C., March 3.—The Department of Justice will shortly move to test the validity of the proposed merger of the Standard Oil Co. of New York and the Vacuum Oil Co. The proceedings will be instituted in the Federal court at St. Louis, Mo., where the Standard Oil dissolution decree was handed down.

The proposed plan of merger has been submitted to the Department of Justice with a request for its views as to the validity of the merger. The Department of Justice deemed it advisable that these questions be passed upon by the courts and has so notified counsel for the two companies.

A statement has been issued by the Department of Justice as follows: "Attorneys for the Standard Oil Co. of New York and the Vacuum Oil Co. recently submitted to the Department of Justice a proposed plan of merger accompanied by opinions rendered by their attorneys, Messrs. Hines, Rearick, Dorr, Travis and Marshall, counsel for the Standard Oil, and A. T. Foster, counsel for the Vacuum company, to the effect that this merger would not be in violation of the Sherman Act and would not violate the decree rendered in 1912 in the dissolution suit to which they were parties. They asked for an expression of the views of the department.

"The conclusion reached in the department was that the nature of the proposal and the questions arising under the dissolution decree of 1912 make it advisable that they be passed on by the courts, and counsel for the two corporations were so advised.

"The proposed merger has now reached a stage where judicial proceedings may properly be taken to test its validity, and they will be instituted within the next 10 days."

NOW COSDEN OIL CO., ILLINOIS

CHICAGO, Mar. 1.—The name of the United Petroleum Co. of this city, distributors of gasoline and other products and owning quite a string of service stations including the large super station at Eleventh Street and Michigan-Wabash Avenue, is changed at this date to the Cosden Oil Co., Illinois. Charles Gower, who was at the head of the United Petroleum Co. previous to its purchase by the Cosden interests, remains with the company in a managerial position. He was formerly of the Sterling Refining Co., which disposed of its stations several years back to the Cities Service Co. The Cosden interests are building up an extensive distribution in this city both through ownership of stations and exclusive contract customers.

TO ADDRESS OIL MEN'S MEETING

W. T. Holliday, president of the Standard Oil Co. of Ohio and director of the American Petroleum Institute, and Paul E. Hadlick, secretary of the Institute's Division of Marketing, will be among the speakers on the program of the second semiannual convention of the Pennsylvania Oil Men's association at Philadelphia March 11 and 12. Both will speak Wednesday, March 12, Mr. Hadlick discussing "The Code of Ethics" at 10 a. m., and Mr. Holliday presenting "The Marketing of Petroleum Products" at 2:30 p. m.

Mr. Hadlick will deliver an address on the marketing code at the triannual meeting of the Tennessee Oil Men's Association at Chattanooga, Tenn., March 15. The meeting will be held March 14 and 15 in the Patten Hotel.

PIPE AND TUBE PRICES ARE WELL MAINTAINED

By B. E. V. Luty

PITTSBURGH, Pa., Mar. 3.—Prices in both pipe and tubes are reported as well maintained all along the line, as has been the case for many months. Producers are particularly punctilious about prices as they realize that cutting would not increase demand but would rather disturb the market.

In the steel industry as a whole, production of ingots or raw steel rose to a rate of fully 80 per cent by the middle of February, having averaged 71½ per cent in January and 59 per cent in December, when there had been a sharp dip, largely seasonal. These percentages are nominal or conventional, being related to capacity as ascertained for December 31, 1928. The new annual capacity rating is being ascertained and will probably come out about 4 per cent more.

Since the middle of February there has been a slight decrease in total steel production and there has been a considerable decrease in the sum total of steel buying, which is rather surprising, just as the sharp increase in January was surprising. At this time of year, with spring so near at hand, steel buying would ordinarily be increasing, for in four of the past six years peak production of steel for the entire year occurred in March, and buying must precede production by at least a little margin.

The steel situation is a complicated one because certain lines of consumption are doing well and have been doing well right along, while other lines are dull. As to steel for agricultural implements, freight car building and repair and fabricated structural steel work the movement has been heavy, with no visible decrease in the last few months and perhaps an increase. As to rails, the annual buying movement began in September and was heavy in the next two months. Production had been very light in September and October, as usual, and it began increasing in November, earlier than usual, being now approximately at the maximum to be expected.

In these four respects steel is very active. In all other consumption it is relatively light. The automobile industry had quite a pick-up in January after its very light December, but it had practically no further increase in February. The two months together are decidedly below the seasonal average, in point of number of cars and trucks produced and the production has been chiefly of light units, involving relatively little steel.

Black and galvanized sheet prices are said to have steadied up more or less to the regular quotations of 2.65 to 3.30 cents. The mills have an ambition to advance prices for second quarter to 2.75 and 3.40 cents respectively but there is a question whether this can be accomplished although admittedly existing prices are altogether too low. Automobile sheets are still quoted at 3.90 cents as the regular market but there has been not a little shading. Other lines are fairly steady, with no particular change.

Late Fields

(Continued from Page 64)

Amerada Petroleum Corp. and Dixie Oil Co.'s No. 3 Fullerton, SW cor. NE SE, Section 19-9-6, in the East Earlsboro Pool, in Seminole County, swabbed and flowed 2,695 bbls. in 2½ hours. Same company's No. 2 Scott, CNL NW SW, Section 19-9-6, swabbed 560 bbls. in 14 hours.

Prairie Oil & Gas Co.'s No. 1 Kendrick, SW cor. NW SE, Section 21-18-4w, in the Lovell Pool, in Logan County, extended the production in that area a half-mile north. The well made three flows from a sand at 4,987-93 feet, two of the flows gauged 125 bbls. and the other flow went on the ground.

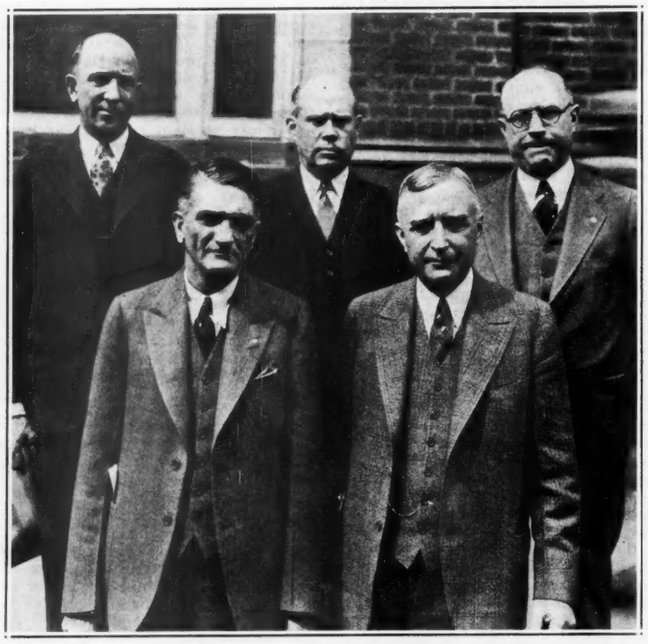
New potentials were taken in the East Earlsboro and East Little River Pools March 1 and 2. The new gauges show the East Earlsboro Pool to be making approximately 115,000 bbls. of oil from 132 wells. The East Little River Pool has about 48,000 bbls. of oil from 57 wells under the new potentials.

Konawa Pool made a new high on March 4 when the 16 wells gauged 11,067 bbls.

The latest well in the pool was the McCulloch Oil Co.'s No. 1 Roberts, NW cor., Section 16-6-6. The well made 182 bbls. of oil from Cromwell sand at a total depth of 2,896 feet.

Hilton Phillips and others' No. 1 Hyde, SE cor. NE, Section 20-6-6, a wildcat 1 mile south of the production in the Konawa Pool, was bailing. The test had a showing of oil in sand at 3,095-3,113 feet.

OFFICERS INDEPENDENT PETROLEUM ASSOCIATION



Officers of the Independent Petroleum Association of Texas, elected February 22 at the State-wide meeting of independent operators at Fort Worth: Charles Morgan, Fort Worth, vice president and secretary-treasurer; Tom Cranfill, Dallas, president; Roy B. Jones, Wichita Falls, vice president. Bottom row: L. D. Ladd, Fort Worth, and J. C. Maxwell, Fort Worth, vice presidents.

WEST TEXAS

FORT WORTH, Tex., Mar. 4.—Texas Pacific Coal & Oil Co.'s No. 3 State, in Section 21-23-36e, flowed 1,200 bbls. in 15 hours through one 4-inch by-pass at total depth of 3,685 feet.

ROCKY MOUNTAINS

DENVER, Colo., Mar. 3.—The deep test being drilled to the Granite in Salt Creek by the Midwest Refining Co. on the Wyoming Associated lease in NW, Section 35-40-79, was deepened 2 feet this week and swabbed 800 bbls. per day. On an official test it made 600 bbls. in 24 hours.

LESSOR'S TAX RULING

CHEYENNE, Wyo., Mar. 1.—The lessor of property is not required to pay a tax on his proportion of the profits from the property when such profits were not received, but were charged against his share of the expense of development, the District Court for the District of Wyoming has held. The owner of the property leased it to an oil company under an agreement whereby the company was to develop the property into an oil field. The company was to bear the entire expense unless oil was produced. If oil was produced, however, the owner was to bear 40 per cent of such expense. The development proved profitable and during the year 1920 a large quantity of oil was sold. The owner's share of the proceeds was charged against his proportion of the expense, but did not entirely liquidate it. These proceeds were not taxable income, the court ruled, pointing out that at the close of the taxable year it was impossible to say whether or not the owner would realize an actual gain on the transaction.

TEXAS NOT TO TAX PRODUCERS OF GAS

FORT WORTH, Tex., Mar. 1.—That there will be no tax placed on natural gas production by the present legislature of Texas is the general hope and belief of the independent operators after adjournment of the House Committee on Revenue and Taxation. With assurance that no such tax would be placed without an opportunity to present further testimony, and no date set when that testimony would be required, producers at committee hearings were excused.

Under Article 7,060 of the state statutes, gas distributing companies are now paying a tax of one-half of 1 per cent in towns of over 25,000 and one-fourth of 1 per cent in towns between 10,000 and 25,000 population. In addition the companies pay one-fourth of 1 per cent to the Texas Railroad Commission to operate the gas division of the commission. It is reported that this latter tax results in paying a surplus into the general revenue of between $100,000 and $150,000 a year above the expenses of the gas division. If the new tax is passed it will be the third tax which gas companies will have to pay on gross production or gross receipts, and would mean about 2 cents additional per 1,000 feet to the consumer.

In case the proposed gas tax became a law it would involve the spending of several million dollars by the producers, who would be compelled to install meters for each well, these meters ranging in price from $260 to $365. A number of wells could be placed on one meter, but about 40,000 gas producing wells over the State would cause the expenditure of a vast amount for such instruments. Representative Pope of Hamlin declared he opposed any tax against the producer, but that he thought the pipe lines ought to be made to pay a state tax.

NEW JERSEY RETURNS AS GOOD AS IN 1928

At the recent annual dinner of the 26 Broadway Club, W. C. Teagle, president of Standard Oil Co. of New Jersey, stated in the course of some general remarks, with regard to business conditions following the stock market break last year, that tentative reports indicated final returns of the company for 1929 would show at least as well if not slightly better than the satisfactory earnings of 1928.

In 1928 Standard Oil of New Jersey reported net profit of $108,485,686 after taxes, depreciation, depletion, amortization, interest and proportion applicable to minority interest. This was equivalent to $4.43 a share on the 24,484,219 shares of $25 par shares of common stock then outstanding.

Mr. Teagle stated, with regard to general conditions, that after a short letdown immediately following the market break industry had swung back into its stride and was now running at practically its normal capacity as compared with the same period in 1929.

BELL ISSUES NEW BOOK

The second edition of American Petroleum Refining, a 630-page book on refinery practices covering all of its phases, has been recently published by H. S. Bell. Mr. Bell published his first book on this subject seven years ago and the author points out that within that time there has been sufficient changes in refinery equipment and processing methods to justify the detail with which he has treated the entire subject again.

A brief summary of the sources of crude oil introduces the subject matter and this is followed by a discussion of the physical chemistry of petroleum and its products. Then the subject of manufacturing methods and equipment is detailed through the various phases including topping the crude, cracking and the manufacture of all standard lubricants.

The book further discusses the design and lay-out for different types of refineries and is intended to serve as a guide to the engineer who has the problem of choosing the correct type of equipment for a given service and who must economically arrange the steps in processing the oil. Pertinent tabulated data and handbook information is also included. The book is being published by the D. Van Norstrand Co., Inc.

MARKHAM ON PRAIRIE BOARD

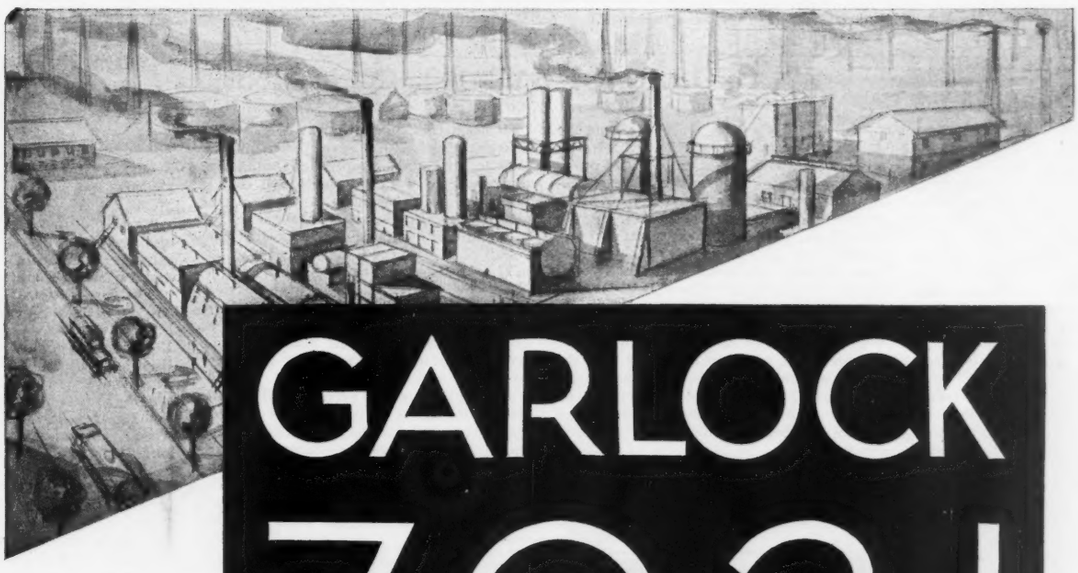
At the annual stockholders meeting of the Prairie Pipe Line Co., held at Independence, Kans., March 4, the following directors were elected: W. F. Gates, C. H. Kountz, F. A. Louy, F. M. Wilhelm and John H. Markham, Jr. Mr. Markham was elected a director succeeding the late George Coyle of Tulsa. Mr. Markham is a well known independent oil operator in the Mid-Continent Field, residing at Tulsa, and at present is president of the Petroleum Corp. of America, which owns a large block of stock in the Prairie Pipe Line Co. recently purchased from the Rockefeller interests.

GASOLINE PLANT IN REFUGIO

HOUSTON, Tex., Mar. 1.—Tentative plans are under way by the United Gas Co. for the construction of a natural gasoline plant in the Refugio Field. The plant will be the first to be built in the field. Details of the plant have not been completed but plans call for an absorption plant of 50,000,000 feet daily capacity.

FRISCO USING NATURAL GAS

SAN FRANCISCO, Calif., Mar. 1.—Pacific Gas & Electric Co. began cutting San Francisco over to straight natural gas this week. The city has been zoned and change-over is being introduced one zone at a time to permit adjustments. Work for whole area is estimated to take 76 days.



GARLOCK 7021

A Sheet Packing Developed to Meet the Severe Requirements of Oil Production and Refining Service

BUILT to withstand the extreme temperatures and pressures found in the modern refinery, Garlock-7021 sheet has met with universal success. It has been adopted as standard sheet packing in hundreds of refineries.

Garlock-7021 is a product which will stand up in service against hot oils and gasolines. Our files contain many reports of successful applications to heat exchangers, cracking stills, fractionating and bubble towers, wax presses, compressors, oil and gasoline pipe lines, gasoline storage tanks and, in fact, on every type and kind of producing and refining equipment. Garlock-7021 is furnished in all commercial thicknesses and in sheets 40″ x 40″ and larger. Gaskets cut from this sheet are styled Garlock-7022.

Without obligation on your part a Garlock Service Man will survey your entire operations and recommend suitable Garlock Packings and Gaskets for each requirement. We solicit the opportunity to co-operate with you.

THE GARLOCK PACKING COMPANY, Palmyra, New York. A World Wide Organization with Sales Offices and Warehouses in all Industrial Centers.

GARLOCK

Of Interest to Sales Departments

BUNKERING FACILITIES DISCUSSED IN REPORTS

By Charles E. Kern

Washington Bureau, The Oil and Gas Journal

WASHINGTON, D. C., Mar. 1.—Details in respect to the oil bunkering facilities of Boston, Mass., are given in a report just completed by the Board of Engineers for Rivers and Harbors, War Department and the Bureau of Operations, United States Shipping Board.

There are three companies at Boston engaged in furnishing fuel oil to vessels. These are the Mexican Petroleum Corp. at Chelsea, the Beacon Oil Co. at Everett and the Cities Service Co. at Braintree. All the companies have facilities for bunkering from the piers and also from barges.

The Mexican Petroleum Corp. terminal is located on Chelsea Creek just beyond the Boston & Albany Railroad bridge and has a capacity of 330,000 bbls. of fuel oil. A channel 25 feet deep at mean low water is maintained. By taking advantage of the tide, steamers of practically any size customarily visiting Boston may be accommodated. Barges supply fuel oil to vessels in any part of the harbor.

The plant of the Beacon Oil Co. has a total capacity of 750,000 bbls. and include 11 underground concrete storage tanks. These tanks can be used at will either for crude oil or fuel oil, but it is the present intention to devote about 600,000 bbls. capacity to crude oil and about 150,000 bbls. capacity to fuel oil. The company can bunker ships at the dock or with its own marine equipment can supply vessels in any part of the harbor. It operates a large refinery and has 18 steel storage tanks with an average capacity of about 200,000 bbls. for use in storing finished light products such as gasoline, kerosene and gas oil.

The plant of the Cities Service Corp. is on the Weymouth Fore River, about one-sixteenth of a mile above Quincy Point Bridge. There is storage capacity for about 150,000 bbls. of fuel oil. No bunkering is done at the plant, but a wharf and pipe lines are maintained for the receipt of fuel oil.

The Beacon Oil Co. receives its fuel oil from Tampico, Mexico, and Galveston, Tex. The Cities Service Refining Co. receives its supplies from Mexico, Texas and Venezuela and the Mexican Petroleum Corp. receives its supplies from Tampico, Mexico.

MARINE DEMAND INCREASES

A substantial increase in marine consumption of Diesel oil, bunker oil, and marine lubricants is indicated by world production figures covering shipbuilding operations in 1929. According to the annual summary of Lloyd's Register of Shipping, there was a greater tonnage of merchant vessels launched throughout the world in 1929 than in any year since the close of the post-war shipbuilding period in 1921. For the year recently ended the total of launchings was about 100,000 gross tons greater than in 1928; but the 1929 figure was more than half a million gross tons less than for the last pre-war year, 1913.

Of particular interest to the American petroleum industry is that section of the report dealing with motorships. While in 1921 only about 8 per cent of all tonnage launched was motorships, the proportion had increased to more than 45 per cent in 1929. Of all tanker launchings during 1929, nearly two-thirds were motorships. Tanker construction fell off materially during the year, an interesting disclosure in view of the current high market for tankers and the relative scarcity of these carriers for charter in the open market.

INCREASED DEMAND FOR PARAFFIN WAX FORECAST BY MILK CONTAINER

Indicative of the increased demand for paraffin wax which may be expected as a result of the adoption of the paper milk bottle by important dairy organizations is the statement of R. R. Reilly, president of the Sealed Containers Corp., New York, that his company estimates a distribution of 40,000,000 packages this year as compared with a distribution of about 4,000,000 in 1929. This type of bottle, first introduced in New York by the Sheffield Farms Co. last year, has been adopted also by the Borden's Farm Products Co., with the likelihood that the action of these two great companies will be followed throughout the country by similar organizations as the advantages of the single-service container are recognized.

Sealcones, as they are called, are made of pure spruce fiber, coated with paraffin. When sealed they are a hermetically clean package. Used in the milk industry, they eliminate cash deposits for bottles, washing of bottles and returning of bottles. They are used once and then thrown away. While the use of the paper milk bottle is in its infancy the use of the paraffin-impregnated container for butter, oysters, etc., continues to grow. It is believed that the use of the paper milk bottle in the milk industry forecasts an immense increase in the demand upon oil refiners for paraffin within a comparatively short time.

Left to right: Dr. A. Mortimer Clark, principal DeWitt Clinton High School, New York; Dr. Shirley W. Wynne, health commissioner of New York; Dr. Paul Brooks, acting head New York State Department of Health, at Sealcone luncheon.

Cleanliness Promoted

Harry A. Cronk, president of the Borden's Farm Products Co., Inc., said in connection with inauguration of single-service paper containers in the distribution of milk in school lunch rooms: "In co-operation with the lunch room management at DeWitt Clinton High School, the Borden's Farm Products Co. is introducing a single-service paper container to be used in the sale of milk to students. These containers, which are of half-pint size, are the first to be employed by the Borden company in any phase of its distribution. It is the belief of Valentine Mayforth, the DeWitt Clinton faculty member in charge of the lunch room, that the paper cone will greatly facilitate the handling of milk. We concur in the view that the use of these dry, single-service containers will promote cleanliness as far as distribution in the school lunch room is concerned and will probably be more expeditious than the present method. We look upon this innovation as a most significant experimental development in milk service. Should it prove advantageous, and we have every reason to feel that it will, we shall consider the use of the sealed cone in this and other sizes in other special divisions of milk distribution."

Health Commissioner Shirley W. Wynne, attending the inaugural distribution of the paper bottles at this school, said: "I look forward to the day when all schools will get their milk in single-service containers, because they are easier to handle and are cleaner."

Dr. Paul Brooks, acting head of the New York State Department of Health, was impressed by the fact that putting up the milk in these containers has resulted in a 100 per cent increase in the drinking of milk by the students. The school now orders 2,000 half pints a day, as contrasted to the 1,000 used previously. Use of the new type of container will become general "more quickly than the automobile displaced the horse" according to veterans of the milk industry, who state that what was an experiment last year is now an established fact.

"Sheffield milk in our containers has

(Continued on Page 292)

I.O.M.A. TO MEET AT CHICAGO

CHICAGO, Feb. 28.—Announcement has been sent to the members of the Independent Oil Men's Association by Secretary Hinchey that the spring meeting and the election of officers will be held at the Sherman House, Chicago. The dates as previously announced are March 17 and 18. At the meeting of the trustee on the 17th inst., a plan was worked out for presentation to the members at the coming annual meeting in March which it is believed assures to the organization a great increase in efficiency and extent and at no material cost to the members.

MUST CONTAIN ALCOHOL

All motor fuel sold in Italy in the future must contain a minimum of 30 per cent of domestic alcohol, according to a report of Commercial Attache M. M. Mitchell. Ministerial regulations will be issued for the operators of this royal decree.

ALLEGE CONSPIRACY IN COMPANY INDICTMENTS

NEW YORK, Mar. 3.—Thirteen prominent oil refining and marketing companies and eight individual officers of the companies involved have been indicted by the Plymouth County, Massachusetts, grand jury, sitting at Brocton, Mass., on a charge of conspiring to destroy the business of the Keith Oil Corp. of Brockton, independent marketers operating service stations in Bristol, Norfolk, and Plymouth Counties, Massachusetts.

The corporations indicted are Standard Oil Co. of New York, the Sinclair Refining Co., the Beacon Oil Co., Cities Service Refining Co., Jenney Manufacturing Co., Richfield Oil Corp. of Massachusetts, Tide Water Oil Sales Corp., Shell Eastern Petroleum Products, Inc., The Texas Company, Gulf Refining Co., Sun Oil Co., Atlantic Refining Co. and Mexican Petroleum Corp.

The charges were filed following an investigation by the Brockton district attorney following receipt of a complaint from the Keith company. It is charged that the companies conspired to destroy the business of the Keith company by cutting gasoline prices in the communities in which that concern did business, it being alleged that the price cutting was done only where the Keith company operated stations.

MINORITY STOCKHOLDERS SEEK TO PREVENT MERGER

NEW YORK, Feb. 28.—Minority stockholders of the Municipal Service Corp., taken over last year by Warner-Quinlan Co., have filed suit in the New York State supreme court for an accounting on property valued at $15,000,000, the suit being directed against Warner-Quinlan Co. The minority holders obtained an order requiring the defendant company to show cause why it should not be restrained from merging the identity of the Municipal Service Corp. in that of the Warner-Quinlan Co.

William W. McFarland, president of the Warner-Quinlan Co., in commenting on the suit, said that the action was brought by a small group of stockholders who were "badly informed" and who had been influenced by persons who had no knowledge of the affairs of either company. He characterized as "ridiculous" the statements of the plaintiffs as to the injury to the Municipal Service Corp., adding that its interests had been greatly enhanced by the Warner-Quinlan Co.

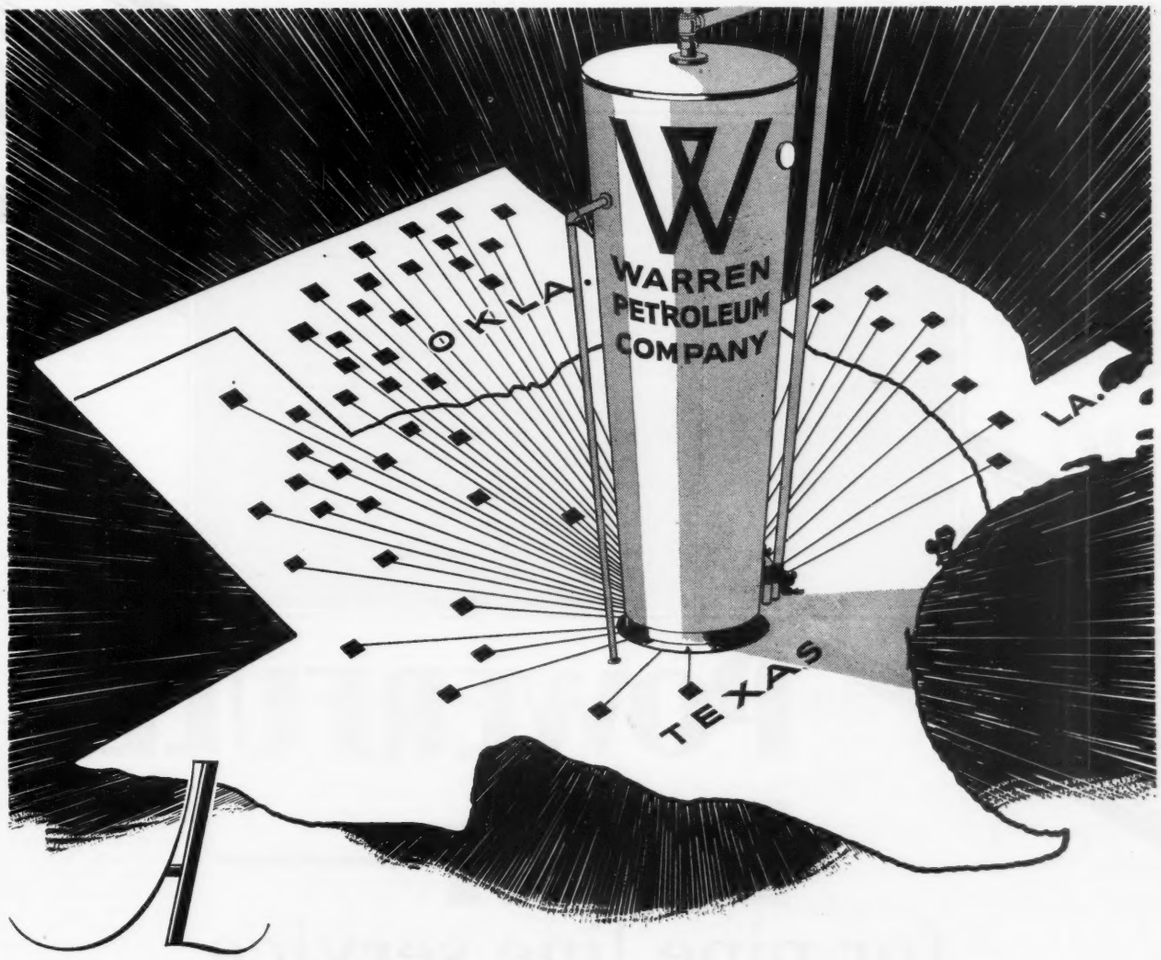
CITIES SERVICE TANKERS

Cities Service Transportation Co. has taken over and renamed the four tankers which it recently purchased from the Oil Transport Co. of Baltimore.

The Herman Falk (capacity 81,481 bbls. of oil) has been renamed Cities Service Ohio. The Clement Smith (also with 81,481 bbls. capacity) has been renamed Cities Service Missouri. The Hampton Roads, with capacity of 81,481 bbls. of oil, has been renamed Cities Service Oklahoma. The Cecil County, which also has capacity of 81,481 bbls. of oil, has been renamed the Cities Service Kansas.

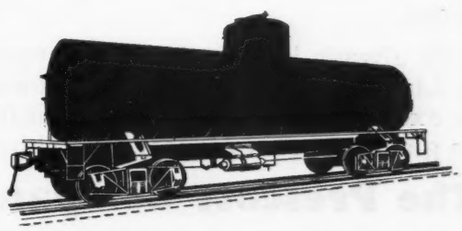
These ships are all of the same hull design, with a deadweight tonnage of 10,250. Three are propelled by steam and one by Diesel engines. They were built in 1920 and 1921 by the Baltimore Shipbuilding Co. at Baltimore, Md.

The Cities Service fleet now consists of 15 tankers having a total deadweight of 160,000 tons and a total cargo carrying capacity of 1,250,000 bbls.



Stabilizing Factor in the•• Natural Gasoline Industry

The manufacturer and the buyer (refiner) of Natural Gasoline both profit from the service offered by the Warren Petroleum Company. The manufacturer is assured of a strong, steady market for his product through a well-equipped selling organization that does not add one penny of overhead to his own costs.



A SPECIAL 68-70 (STABILIZED NATURAL) 350-375 END POINT FUEL

The refiner spots his orders for all his requirements in Natural Gasoline with one source of supply. More than fifty contract plants operated by the Warren Petroleum Company are able to supply any grade of Natural Gasoline, in addition to Warren's special stabilized 68-70, 350-375 end point, in any quantity for immediate delivery to any refinery point.

WARREN Petroleum Company

TULSA "JUST NATURAL GASOLINE" OKLA.

Exchange Bank Building

Prescott Menominee Pump used by Magnolia Pipe Line at Big Spring, Tex.

POWERFULLY BUILT —
for pipe line service

EVERY part of Prescott Menominee pumps is made to meet the hardest conditions possible in oil field and pipe line service. Ample strength, plenty of power, and astonishing wearing ability always distinguish Prescott Pumps. They are either electric or engine driven and can be depended upon absolutely for steady, unbroken work.

Prescott Menominee electric pumps easily maintain an overall mechanical efficiency between 80 and 86% through a wide range of operating conditions.

Pumping costs are always kept at a minimum when Prescott Menominee Pipe Line Pumps are used. Both power costs and maintenance costs are exceptionally low. Complete information and performance records gladly sent on request. No obligation.

The Prescott Company

Menominee, Michigan, U. S. A.

Pumps for deep mines ~ Pumps for pipe lines

OGJ 8-6 Gray

PLANT OUTPUT SHOULD BE DETERMINED BY SALES

(Continued from Page 114)

put of gasoline can be brought up to the required amount. The saving on crude will in such case offset in a large measure the sacrifice due to decreased runs.

Of course, every plant will have to work this out according to its conditions, price of crude, price of gasoline, operating costs, and per cent yield of gasoline. In one plant this has been gone into very carefully. It was found that in a market like the present, this plant could cut its crude runs 30 per cent and show about the same earnings, by getting a larger per cent yield of gasoline. For this particular plant it was found that with a good market and demand it paid best to increase runs to stills, and get only a 48 per cent yield of gasoline. Also it was found possible to get as high as 65 per cent over all gasoline yield by reducing crude runs and cracking to the limit.

From the standpoint of conservation, especially in a market such as we have at present, any refinery, large or small, would do well to look into the possibilities of the elasticity possible in cracking methods.

While we have no way to control all refineries, it is quite possible that each one can control itself, by fitting its performance to the general situation. Depending entirely on the law of supply and demand and expecting the weaker plants to drop out or close down is too expensive for all.

One other rational way is to let the sales department determine in a large measure what the output of the plant should be, rather than to have it determined by some one else, and then instructing the sales department to sell, regardless of price. Any well managed sales department should have a fair idea of about what amount could be sold at a fair price, or about what reduction in output should be made generally to bring supply back in line with demand.

Summed up, it would seem from a study of available information:

1. That if every refinery in the country, large and small, would immediately cut its gasoline production only 10 per cent, the situation would soon be brought back into line.

2. In view of present low prices for gasoline, the majority of the plants could make this slight reduction in production without any great hardship as regards reduced earnings.

3. Even if in some cases, as in that of skimming plants, such reduction involved temporary losses, such losses will be made up many times over when supply and demand are properly balanced, and a reasonable price is obtained for the gasoline.

CAPACITY NEARS FOUR MILLION BARRELS DAILY

(Continued from Page 139)

Standard-Vacuum merger is finally consummated the two companies and their subsidiaries will have 17 operating refineries with a daily crude oil capacity of 248,500 bbls. daily. These plants are well scattered from the west to the east coast and will give the combined companies the refineries needed for a nation-wide distribution of petroleum products. Both companies have large export interests.

Another major consolidation of the year was the merger of the Continental Oil Co. and the Marland properties. Previously the Marland Refining Co. had taken over the Baltimore refinery of the Prudential Oil Corp. The consolidated companies which are now operated under the name of the Continental Oil Co. has several refineries in the Mid-Continent and Rocky Mountain areas in addition to the east coast plant.

There were several smaller mergers involving refining organizations. From the refining end there has come a more general recognition of the benefits of large scale operations in order that advantage can be taken of the numerous improvements constantly being made in refining methods. The trend toward national distribution of products is another development which has given impetus to the consolidation movement.

Other consolidations are pending at this time and it is probable that in number and size those completed in 1930 will equal those of the year that has just closed.

Comparisons by States

The crude oil capacity of California's operating refineries increased from 859,150 bbls. to 890,800 bbls. daily during the past year and for the same period the cracking capacity jumped from 117,000 bbls. daily to 160,000 bbls. daily. The cracking capacity of the California plants is still relatively small in relation to their crude oil capacity. In gasoline output the California refiners as a group led every other area. This was due not only to the expansion of operations but was also a development of the fact that the bulk of the new crude oil supply has been of lighter gravity than the old and greater yields of gasoline were obtained in the cracking operations.

The middle western group of refiners have had an exceptionally large increase in plant facilities and this is reflected in the data which show that the crude oil capacity of the Illinois refineries increased from 104,000 bbls. daily to 135,500 bbls. daily and Indiana refineries from 139,600 bbls. to 175,000 bbls.

Texas had the largest increase both in number of refineries and the rated crude oil and cracking capacities of its plants. The State now has 81 operating refineries with a crude oil capacity of 813,700 bbls. daily and a cracking capacity of 494,950 bbls. daily. A year ago 75 refineries were operating with a crude oil capacity of 746,500 bbls. daily and a cracking capacity of 412,400 bbls. The bulk of the increase both in crude oil and cracking capacities came from the Gulf Coast area where several of the industry's largest plants are located. The remainder of the increase came from the West Texas area.

The capacity of the operating refineries in Louisiana is less than it was a year ago due to the shutdown of the Sinclair Refining Co.'s plant at Meraux. This plant had a skimming capacity of 30,000 bbls. It is understood that the company does not expect to resume operations. The plant on the Houston ship channel will be enlarged as a result of this shutdown.

With the same number of operating refineries, the total crude oil capacity of Oklahoma plants increased from 288,500 bbls. daily to 313,900 bbls. daily. Five additional plants added cracking capacity during the year and this capacity totaled 117,050 bbls. on March 1.

With nine plants operating both years, the crude oil capacity of the refineries in New Jersey increased from 300,000 to 312,000 bbls. daily. With 47 operating refineries—two more than last year—Pennsylvania plants now have a total crude oil capacity of 236,500 bbls. daily and a cracking capacity of 87,250 bbls. daily. A year ago the crude oil capacity was 214,300 bbls. daily and the cracking capacity 45,200 bbls. daily.

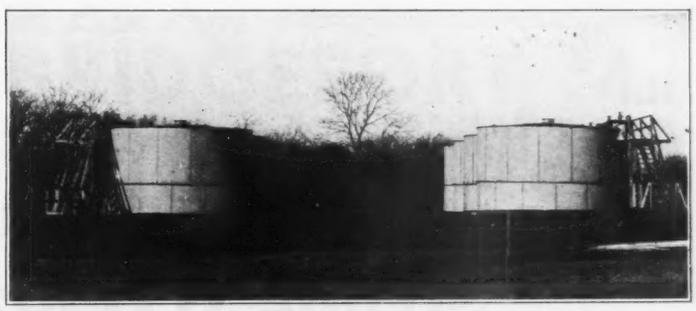
Most of the remaining states showed small increases in both crude oil and cracking capacities. Montana increased the number of its operating refineries from 12 to 17 with a total rated capacity of 30,300 bbls. daily. Most of these are small local plants which operate part time. In a few cases they are shut down during the winter months when there is very little demand for gasoline.

TAX ON GAS ARGUED BEFORE LEGISLATURE

(Continued from Page 100)

feet, while the value of the entire production was $10,267,660, the value at the point of consumption of less than one-tenth of the production was $18,307,564.

"The gas used for industrial purposes was as follows: 106,104,000,000 feet were used in the fields for the purposes of drilling, pumping, operating gasoline plants, etc., and was valued at $12,749,000; 27,641,000,000 feet used as fuel at



Eight 1,000-Bbl. Maloneys on B. Johnson No. 3, Oklahoma City. Erected for Cromwell, Franklin and I.T.I.O. Co., by distributer, Maloney Sales Corp.

Wasted Oil is Wasted Money

Maloney Vapor-Pressure Tanks Save Both

Oil costs money to produce and is worth money delivered to the pipe lines. When breathing of lease tanks dissipates the most valuable portion of your oil, it is wasting money for you.

Our *Vapor-Pressure* flow and stock tanks are manufactured to *prevent breathing*. They add so much to your income that you can't afford to use any less efficient method of handling your oil.

"Alone in Quality"

Maloney A.P.I. Bolted Steel Tanks conform with A.P.I. dimensional standards and carry the official A.P.I. monogram.

MALONEY TANK MFG. CO.

Tulsa, Okla., U.S.A.

Distributers at All Principal Petroleum Points

MADE OF KEYSTONE AMERICAN COPPER STEEL

MALONEY PATENTED BOLTED COPPER-STEEL TANKS

MALONEY ALONE!

Strong Arms ~ Strong Wrenches

the best team for hard work

TRIMO

NO SUPERINTENDENT wants to hire men who aren't strong enough to stick on the job. No workman wants to be put to work with a wrench not strong enough to stick on the job either.

Strong arms and strong wrenches make the best team for work in the oil fields. TRIMO gets the call where a strong pipe wrench is wanted. TRIMO is all steel—the handle drop-forged, not cast—and heat treating adds toughness that stands the strain of brawny arms.

TRIMO Pipe Wrench

All Steel for Strength

Made by Trimont Mfg. Co., Inc., Roxbury (Boston), Mass.

petroleum refineries (value not given); 62,749,000,000 feet were used in manufacturing carbon black, valued at $1,576,000, and 93,010,000,000 feet were used by other industrial plants, valued at $21,640,000. The value of the gas at the point of production was $10,267,660, while the value of the gas at the point of consumption was $54,272,564.

"There was treated for gasoline during the year 1928 300,769,000,000 feet of natural gas, which produced 324,516,000 gallons of gasoline valued at $22,492,000 or 6.9 cents plus, per gallon.

"There was used in the manufacture of carbon black 62,749,000,000 feet, which produced 100,828,000 pounds of carbon black valued at $5,706,000, or 5.6 cents plus a pound. The value of the gas itself, treated for carbon black, was $1,570,000, the value of the manufactured product was $5,706,000, thus making a difference of $4,130,000.

"Of the Texas production 173,173,000 feet of natural gas is piped out of the State every day, which indicates the yearly amount going out of the State as 63,208,145,000 feet. The Cities Service Gas Co. through its Wichita Falls line takes out of the State daily 85,143,000 feet, the line to Denver takes out daily 61,530,000 feet, the Consolidated line to Oklahoma 25,000,000 feet a day, and the United Gas Co. line to Monterey, Mexico, 1,500,000 feet at present and will without doubt far exceed this amount in a short time.

"The estimated average value at the well being 3.4 cents per 1,000 feet, while at the points of consumption the average value is 17 cents per 1,000 feet, the value at points of consumption is 400 per cent increase over the value at point of production."

Would Increase Waste

Gas now going to waste in oil fields totals 800,000,000 feet daily, it was revealed by R. D. Parker, chief of the State oil and gas division, while the amount consumed is 318,000,000 feet. In one year's time, should the industry be swatted by the tax, the waste would reach the tremendous total of 310,000,000,000 feet. The tax proposed under the Sanders bill is equivalent to the total income of producing companies, large or small. While the measure starts out with only a fourth of a cent tax, it runs up to 2 cents per 1,000 feet. Most of the production comes under the 2-cent scale.

The Texas Company, it was pointed out by J. F. Wolters of Houston, its representative, has 109 wells, drilled for oil but which turned out gassers. The company is not in the gas business, so sells the product at 2½ cents the 1,000 feet. When gas instead of oil is found the company sells to pipe lines, which in turn sell to distributors. The 109 gas wells of The Texas Company produced 5,782,000,000 feet of natural and 30,000,000 feet of casinghead gas during 1929. At the price of 2.6 cents per 1,000 feet the company received a total of $830,000. But the operating expenses and royalties totaled nearly $400,000, minus the cost of investment and interest.

Under the Sanders measure the first 100,000 feet would bring the State $250, the second 100,000 feet the sum of $500, the third 100,000 feet the sum of $1,000, the fourth 100,000 feet the sum of $3,000, and all production above 500,000 feet the total of $170,000. These figures are quarterly, so the collection from the production for a year would be $701,000, largely exceeding the total income.

"All other producing companies will find themselves in exactly the same position as ours," Mr. Wolters said. "If the tax goes on we will just close up shop and let the gas go, for we are chiefly in the oil business."

The two gas tax bills on the house calendar do not specify pipe line companies or distributors, but direct the tax against the producer alone.

The gas tax is one of 15 so far introduced and the 15 bills fix a tax on 75 different subjects.

When the bill was proposed it was said to have the approval of Governor Moody, who in various speeches the last few months advocated conserving the supply and putting on a tax. He said the gas was being transported to other states, Texas getting no returns.

"As a matter of fact," Mr. Wolters said, "Texas is now importing 50,000,000 feet daily more than is sent out of the State. The records show it."

PROBLEMS IN APPLICATION OF CONTROL INSTRUMENTS

(Continued from Page 201)

effect by lagging the rate of change of outlet flow behind the actual rate of change of level in the container. The application engineer attempting to meet this problem should be presented with complete details as to the maximum variation between possible inlet rate and desired outlet rate, and with the diameter of the container and permissible variation in level, because it is a problem of balancing rates in proportion to the variations in the process rather than a problem of instrument design.

In such a problem it would also be very desirable that accurate information be given as to the conditions under which the controlled valve must operate since its size is instrumental in determining the outlet rate of flow. Such details require that if this idea of lagging is to be used to accomplish more desirable results it must be done by resident engineers perfectly familiar with the problems involved. Beyond certain degrees, depending on the conditions of the process, lagging might easily set up conditions of surging which might be more undesirable than permitting the outlet rate of flow to be proportionate to the inlet rate. In view of the complications involved this scheme of obtaining more uniform outlet rates is not recommended for general application, although it has been used very successfully where conditions of the process permitted.

Uniform Outlet Rate

This problem of obtaining a uniform outlet rate that is equivalent to an average inlet rate, however, is not without solution as far as instrument design is concerned. Desired results may be obtained by using a specially designed ratio controller in such a way that the primary instrument is used as a liquid level controller and the secondary instrument is used as a flow controller controlling a uniform outlet rate of flow. In this combination, the liquid level controller sets the control point of the flow controller, but the special construction permits it to reset the flow controller only at certain maximum and minimum levels; thus the liquid level may vary between these limits without causing any change in the outlet rate of flow and, if the storage capacity of the container is sufficiently large in comparison to the fluctuation in the inlet rate, this combination will permit an outlet control entirely independent of variations in inlet rate.

Although we have dealt considerably with this more complicated application of liquid level control, we must bear in mind that by far the greater number of applications are those in which it is desirable that the outlet rate be maintained equal or directly proportional to the inlet rate. In a great many problems, especially in refining applications, it is possible to install flow controls at some location which will effect a uniform inlet rate. Such combinations of flow controllers and liquid level controllers are quite desirable in establishing an internal balance within the process.

The application of liquid level control to prevent the overflow or complete drainage of liquid from a container is an entirely different type of control problem. It is extremely simple, because neither the actual level nor the rate of inlet and outlet flow is important. It is only necessary that the level remain within such limits that the tank never drains empty or overflows. The problem involved is not as complicated as those previously discussed and can be adequately handled by any commercial type of liquid level controller.

Ask Any
BRIDGEPORT Man
to tell you about the many advantages of the
WRIGHT
HEAVY DUTY - SLOW SPEED
DRILLING ENGINES

Lowest Price per Horse Power
Operated by Natural Gas or Gasoline

WHEN WE sell you a Wright Engine, we stand back of it. Our 17 branches, all offering 24-hour service, are your guarantee of maximum service on these engines, as well as all other products sold by Bridgeport.

The BRIDGEPORT MACHINE CO.
GENERAL OFFICES AND FACTORY, WICHITA, KANSAS
Branches Throughout the Oil Fields

Ideal Where Large Quantities of Melted Material Required

AMERICAN CHIEF ASPHALT HEATER

250
500
1000
Gal. Cap.

Other Heaters of 30, 60, 100 and 165 Gallons

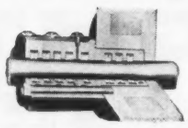
Users know that "American Chief" Heaters give complete satisfaction in the heating of tar, pitch or asphalt. And they know the design is such that larger quantities of perfectly blended hot stuff is given in a minimum of time. Catalog tells all. Write for your copy today.

New Catalog Available

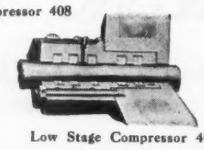
American Steel Works
1211 West 27th Street
KANSAS CITY, MO.

COOK'S GRAPHITIC IRON ROD PACKINGS

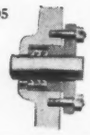
A PACKING FOR EVERY OIL FIELD SERVICE



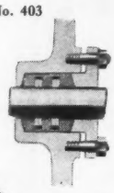
High Stage Compressor 408



Low Stage Compressor 405



Partition Plate Wiper No. 403



Power End Packing No. 30

Quality Commands the Market

A basic idea over 40 years ago—COOK'S anti-friction Rod Packing is today an economic force pitted against inefficiency.

When the leading oil and gas companies in all fields choose "COOK'S GRAPHITIC IRON" Packings for the power and compressor ends of their air lift and gasoline extracting units—

And when ordering new equipment cover their use by specification—

And change over existing equipment as time allows—

Doesn't it prove your company, too, will effect savings in packing costs, repairs and efficiency by the use of these Advanced Packings?

May we send you the Facts?

C. LEE COOK MANUFACTURING CO.

Incorporated

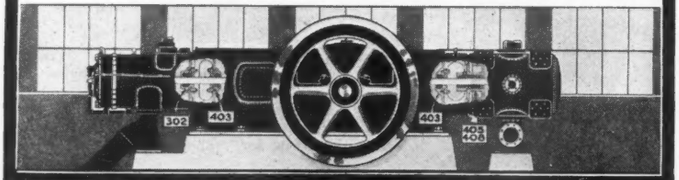
Louisville, Ky.

New York 13 Astor Place — Los Angeles 1855 Industrial St.

Oklahoma & Texas Tulsa, Okla.

A Few Users

Columbia Gas & Electric Company
General Petroleum Co.
The Gulf Companies
Houston Pipe Line Co.
Humble Oil & Refining Co.
Indian Territory Illuminating Oil Co.
Midwest Refining Co.
Phillips Petroleum Co.
Industrial Fuel Supply Co.
Sinclair Oil & Gas Co.
The Shell Companies
Standard Gasoline Co.
The Texas Co.
Union Oil Co.
United Fuel Gas Co.
McMan Oil & Gas Co.
Signal Gasoline Co.
Barnsdall Oil Co.
Chestnut & Smith Corp.
Skelly Oil Co.



"40 YEARS SERVICE BUILT IN"

HELIUM CO. DECLARES GOVERNMENT UNFAIR

(Continued from Page 100)

cause the Navy Department is the Helium Co.'s biggest customer, taking about four-fifths of its output.

"There are only two large-scale producers of helium in the world. One of these is the Helium Co. and the other is the Bureau of Mines. With both manufacturers closed down, no helium is being produced today and all users are drawing on their reserve storage for current supplies.

Does Not Share Critical Opinions

"Since the Navy Department has not placed orders with either manufacturer for this 3,000,000 feet of helium, it may be there is no present need for this quantity of helium. Whatever reason the Navy may have for withholding orders, the Helium Co. does not share with its competitor, the Bureau of Mines, any adverse critical opinions for their mutual customer, the Navy Department.

"The cost figures given by the Bureau of Mines are misleading because they fail to include so many items of government expense. The Bureau of Mines omits entirely from its cost figures such regular annual expense items as administration, $20,000; interest on investment, $88,000; depreciation on plant and equipment, $87,500; depletion of gas wells and gas reserves, $56,200; and research and investigations incident to helium production, $75,000.

"The total of these omitted items of expense is $326,700. At normal rate of operation, this is equivalent to at least $30 per 1,000 feet of helium produced. If the so-called 'government cost' or plant operating cost of from $9.70 to $15.70 per 1,000 feet is added to the other costs, the real government cost of helium produced by the Bureau of Mines in the Government's Amarillo plant appears to be from $40 to $45 per 1,000 feet.

"When this complete cost is compared with the Helium Co.'s selling price of $34 per 1,000 feet, the extravagance of government operation becomes apparent.

Expenses Go On, Idle or Running

"The Bureau of Mines' expenses at Amarillo are almost the same when the plant is idle as when it is in full operation. The director of the Bureau of Mines stated that after fixed expenses are paid, amounting to $9,500 per month, the only added expenses that accrue due to running the plant are equivalent to $3 per 1,000 feet.

"It would be helpful if this $3 extra expense could be eliminated. It consists of gas royalties, chemicals and supplies used in the process of helium extraction. When money recently appropriated by Congress for gas rights for the fiscal year 1931 is applied, the gas royalties will be eliminated. Then there would only remain for Congress to provide funds to establish the Bureau of Mines in the chemical manufacturing business and other supply lines. Then, with free gas and free chemicals and supplies, the Navy and Army can get helium from the Bureau of Mines free, provided they take care of the $9,500 pay roll every month between them.

"When the Navy Department buys from the Helium Co. the whole cost of the Government is the price paid of $34 per 1,000 feet. The Navy Department is not called on by the Helium Co. to sustain its stand-by expenses when the company's plants are not in operation. The Bureau of Mines expects the Navy to pay the plant labor, amounting to $9,500 per month, and all other expenses, even though the Amarillo plant is not operating. These shutdown expenses added to the already high government costs, put these costs still further out of line.

Investment of $2,200,000

"The Government already is committed for an investment of $2,200,000 in the Amarillo helium project. If this plant is operated to supply current helium needs of the Navy and Army, further investments in gas wells, pipe lines, compressor stations and plant equipment are estimated to run from $3,000,000 to $10,000,000.

"The Government was in the helium producing business at Fort Worth, Tex., from 1917 to 1929. Total government expenditures on that project were about $12,000,000 and only 48,000,000 feet of helium was produced during all this time. The average cost of the helium produced at Fort Worth was $250 per 1,000 feet. The transfer price, or so-called 'government cost', never exceeded $50 per 1,000 feet.

"When the Helium Co. began producing helium in 1927 the Bureau of Mines was charging the Navy and Army about $48 per 1,000 feet. The Helium Co.'s price, which included a fair profit, was less than $35 per 1,000 feet. Not only was the Bureau of Mines' price high, but the quantity being produced was insufficient for Navy and Army needs.

"Sixteen months after the Helium Co. received its first contract for helium from the Navy Department, the Bureau of Mines began to build the Amarillo plant.

"The necessity of meeting the competition of private industry in supplying helium needs of other government departments compelled the Bureau of Mines to abandon the high-cost Fort Worth plant, regardless of large investment there by the Government, and embark on the new and bigger helium project at Amarillo, Tex. Even with the unlimited resources of the United States Government behind it, the Bureau of Mines is not today producing helium as cheaply as the private commercial producer and is dependent on interdepartmental bookkeeping and partial cost figures to justify its continued operations.

Private Operation Cheaper

"On any common basis of comparison, the costs of the private commercial producer are substantially lower. The Helium Co. would welcome any full and impartial investigation of its record. The Helium Co. is confident that the traditional economy and efficiency of private industry have been upheld and maintained by its operations.

"The basic law know as the 'helium act' only requires the Bureau of Mines to produce helium 'when helium cannot be supplied by private parties at less cost.' Furthermore, this law requires the Bureau of Mines to include all expenses in arriving at its costs. The Helium Co. declares that the Bureau of Mines has always and still is disregarding this law entirely. There would be no conflict today over helium if the Bureau of Mines observed the spirit and letter of the fundamental law covering this subject.

"The primary purpose of the 'helium act' was to conserve helium for the purpose of the national defense. Helium is recognized as a military necessity. Congress enacted the 'helium act' to protect the country in possible future national emergencies. The wording of the act makes it very clear that the intention was to avoid putting the Government into business in competition with private industry.

"The activities of the Bureau of Mines nullify the expressed will of Congress and defeat both the primary purpose of conservation for strengthening the national defense and the secondary purpose of procuring helium economically."

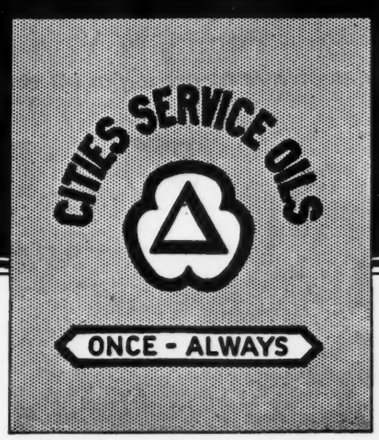
GEOPHYSICS IN EGYPT

The geophysical investigations being carried on by the Egyptian government in the search for oil have given good results, especially in the neighborhood of the Red Sea. The mining department has applied for a new and larger appropriation from the treasury, to be applied to the use of the most modern methods by foreign geologists.

GASOLINE TAX CRITICIZED

An editorial in the New York Times makes the point that the revenue from the gasoline tax should be equitably distributed and that the rates should not be so high as The Oil and Gas Journal said, as to kill the goose which lays this golden egg. The proposed increase in the New York State gasoline tax is open to discussion and that all the money from the proposed increase should be spent on roads.

No service too severe—no specifications too high. No product bearing our name is permitted to reach the hands of a customer until it first meets our own rigid tests.



Build your business on our reputation for satisfactory petroleum products

Empire Oil & Refining Company

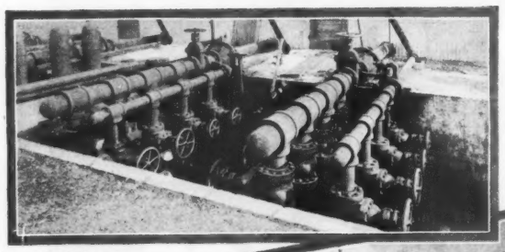
Subsidiary Cities Service Co.

GENERAL SALES OFFICES—TULSA, OKLA.

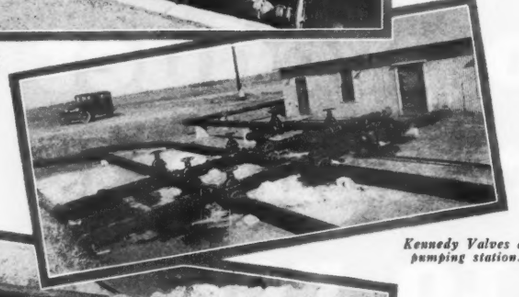
NEW YORK PHILADELPHIA CLEVELAND CHICAGO ST. PAUL
KANSAS CITY ST. LOUIS FORT WORTH TORONTO

For dependable valve service—

specify KENNEDY

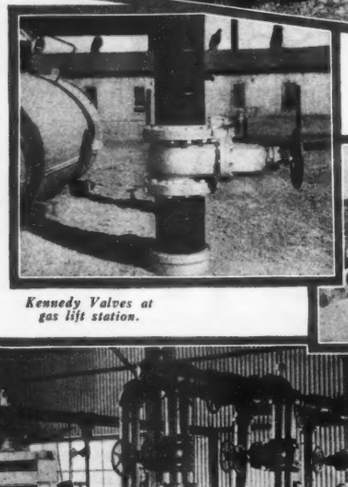


Kennedy Valves at manifold of tank farm.

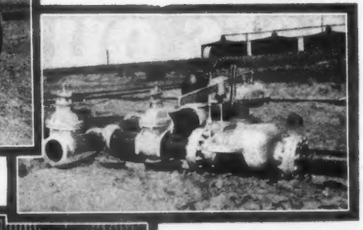


Kennedy Valves at pumping station.

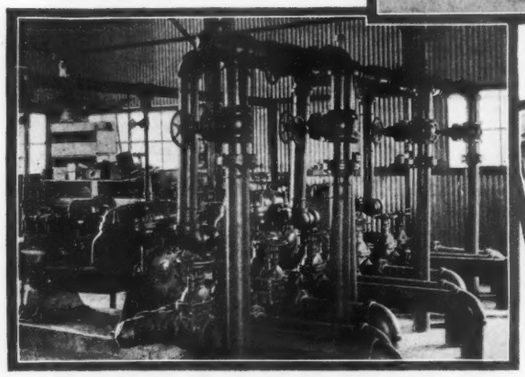
Kennedy Valves on high pressure pumping service.



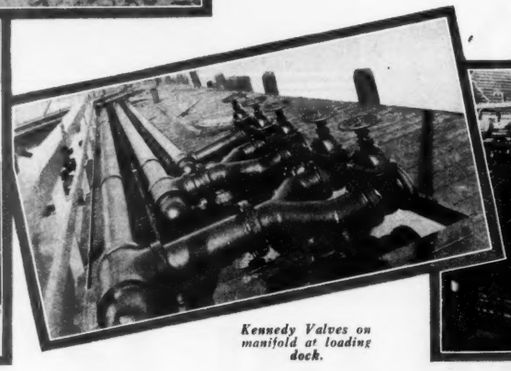
Kennedy Valves at gas lift station.



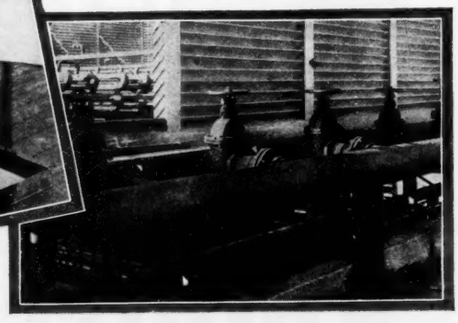
Kennedy Valves on gas stripper.



Kennedy Valves in compressor room.



Kennedy Valves on manifold at loading dock.



Kennedy Valves on manifold of cooling coils.

NOTE the wide variety of pipe line, power plant and field requirements served by the Kennedy Valves shown in the accompanying illustrations.

Wherever crude oil, petroleum products, natural gasoline, water, steam or air is to be controlled, a specially designed Kennedy Valve type has proven its effectiveness, efficiency and durability in many installations throughout the petroleum industry.

Large stocks maintained by dealers and our own warehouses provide prompt delivery for all standard requirements, and the extensive manufacturing facilities of two large plants assure quick shipment on special orders.

The Kennedy Valve Mfg. Co.,
Elmira, N. Y.
Sales offices in principal oil centers

KENNEDY

VALVES-PIPE FITTINGS-FIRE HYDRANTS

PROCESSING CRUDE OIL OF TEXAS PANHANDLE

(Continued from Page 136)

diameter towers designed under the Bonner-Sheldon patents owned by the Macmillan Petroleum Corp. The plates are essentially a confined wash over a perforated area.

Stripper

The stripper is composed of ten flashing and six washing plates, the oil from the salt settler entering above the ten flashing plates flowing downward, the vapors being liberated upward to be washed. The superheated vapors from the direct contact heater, "D," previously mentioned, are introduced three plates under the oil inlet, these hot comparatively light vapors exerting a marked flashing effect on the oil. Steam of 50 degrees super heat is used for flashing in the remaining seven plates.

The fuel oil leaving the bottom of the stripper passes into the 72-inch vacuum tower, "E," without pumping. In the vacuum tower it is subjected to 26 to 27 inches of vacuum where small amounts of steam are used through the plates of this tower for flashing. From 5 to 7 per cent of gas oil is recovered by the vacuum tower with no additional heating after the oil leaves the stripper. The vapors from the stripper pass into the three fractionating towers, "H," "I," "J," with five flashing and 17 fractionating plates each.

Reflux is pumped hot from the bottoms of each tower to the tower preceding with the exception of the gasoline reflux which is obtained from the warm dewatering drum. It has been found absolutely essential to use hot reflux in these towers to prevent corrosion. The primary gasoline reflux while warm might possibly cause fugitive or shock condensation and consequent corrosion. To prevent this a set of cast iron trays from an ordinary feed water heater has been installed above the regular plates of the final fractionator, "J." The gasoline reflux is introduced onto these trays where it is heated to control temperature by direct contact with the surrounding vapors. Steam of 50 degrees super heat is used in all towers for flashing. The products leaving the towers are all finished with the exception of treating.

Products Recovered

The products at present being recovered by these towers are as follows:

Fourty-four per cent, 26 gravity, fuel oil, 325 to 350 flash, Hemple initial 450 to 475. Average recovery 2 per cent, 540 degrees.

Ten per cent, 32-34 gravity, light straw gas oil.

Four per cent, 38 gravity distillate.

Seven and one-half per cent, 41-43 gravity kerosene.

Thirty-two and one-half per cent, 420 degrees endpoint gasoline.

Gasoline Fractionation

The gasoline fractionation shows 30 degrees temperature between the 90 per cent and endpoint. Gaps between various products may be carried to 25 degrees. Considering the unusually low temperature of the vapors in this equipment these results are very gratifying.

Actual plant operation has established the fact that these towers have an efficient working range of from 2,800 to 6,500 bbls. per day. Running below 2,800 bbls. per day, fractionation and recovery fall off slightly, probably due to raining from plate to plate. Runs above 6,500 bbls. per day may be readily accomplished but at 8,000 bbls. per day entrainment is prohibitive. It has been demonstrated that by hot condenser control, the capacity of these towers may be raised to 11,000 bbls. daily.

The gasoline leaving the towers in vapor form is contacted in a scrubber tower with a weak solution of caustic soda, water from the gasoline dewatering drum being used for makeup. Small amounts of gasoline which are condensed in this caustic scrubber are returned by gravity to the condensers for cooling. The vapors leaving the caustic scrubber pass into bent tube condensing sections which are sprayed with comparatively hot water.

Admiralty metal tubes have proven the most economical in this service. The hot water is used to refrain from shock condensation in these tubes. The condensed gasoline and remaining vapors from these condensers pass into a dewatering drum and then into enclosed coolers which are supplied with water from a separate cooling tower. The alkalinity of the stream is tested regularly to maintain control. The condensation equipment in this plant prior to the installation of the caustic scrubber and the Admiralty metal tubes was very severe. Erosion also plays a very important part so velocities are held comparatively low.

Condensing Sections

Cast iron condensing sections installed when the plant was first built were corroded through in from five to seven days. Lowering the velocities in these same cast iron condensers increased the life to 60 days. Various stainless steel tubes used in the bent tube condensers showed approximately one-third the life of Admiralty metal tubes.

The chlorine present in these vapors is no doubt responsible for a large, if not the larger, amount of this corrosion. The gasoline is treated by the lead sulphide method with the subsequent diatomaceous earth filtration to remove lead. The kerosene is treated by acid, clay and Doctor treatment.

During the boom days of the field, gasoline that was doctor sweet and noncorrosive in the finished storage tanks would be found to be sour and corrosive after loading. It was discovered that the hydrogen sulphide, at that time in noticeable quantities in the air, was being absorbed by the gasoline.

When this plant was first started shut downs were necessary as often as 6 hours due to plugged and corroded equipment. This plant is now frequently on the stream 30 days, averaging 180,000 bbls. per month without a shut down.

MUCH TO MASTER IN CHEMISTRY OF OIL

(Continued from Page 133)

crude oil can become the source of important and valuable iso and tertiary alkylated benzenes such as cumene, p-cymene and tertiary butyltoluene.

Petroleum Gas Analysis

In research of practically all description upon the subject of gases or gasolines many troubles are encountered with regard to analysis, where older methods are, in many cases, far from satisfactory. In the first instance, recent work has raised the analysis of petroleum gases to a very high standard and efficient fractional distillation apparatus has been described in this journal. These distillation methods for the analysis of petroleum gases actually fractionate the gas into its constituents such as methane, ethane, ethylene, propane, propylene, etc. Other forms of apparatus have also been described where the gases are fractionally condensed, but these usually separate them into fractions rather than pure individuals. In the case of the unsaturated constituents the bromination of the olefins and subsequent fractionation under reduced pressure is a method of high reliability and usefulness.

Chemical Analysis of Gasoline

The analysis of gasoline as regards its content of hydrocarbon series such as paraffin, naphthenes, olefines and aromatics is also a field where much research has been carried out and which needs still more for completion. The question might be asked what is the value of such a chemical analysis when engine tests rapidly evaluate a gasoline as regards antiknock value especially in view of the variation in this quality of members of the same hydrocarbon series. The reply is that such research when conducted side by side with engine testing will without doubt be capable of partial or complete correlation before long. This chemical testing of gasolines may not be carried out under precisely the same projects as formerly, i.e., differentiation of the gasoline into the hydrocarbon series paraffins, unsaturated, etc., but

NATURAL GASOLINE

ALL GRADES
ANY QUANTITY

NATURALINE
THE SUPER-AVIATION FUEL

NATURALINE
A SUPER AVIATION MOTOR FUEL

A MOST DEPENDABLE SOURCE OF SUPPLY

CHESTNUT & SMITH
CORPORATION
CHESTNUT & SMITH BUILDING
Tulsa Okla.

PIONEER MANUFACTURER AND MARKETER

ALBERTA OIL MANUAL

COMPLETE CONCISE AUTHORITATIVE

Send For This Book at Once

Contains all the available facts—revised to date—of every Western Canadian Oil Company—active, dormant or defunct.

Gives in full detail—holdings, directorates, form of incorporation, capitalization, amount of stock issued—with purpose of issuance, and present state of development of all companies operating in Western Canada.

Table of comparative value of oil stocks. Details of mergers and splits.

Every investor, broker or oil man should have a copy of this valuable handbook.

Send 50c today for your copy.

CALGARY ALBERTAN

OIL MANUAL

published by

The Albertan Publishing Co., Ltd.

ALBERTAN BUILDING

Calgary, Alberta

QUANTITY PRICES ON APPLICATION

Order CINCINNATI GLOBES NOW

Get Ready For Summer Business

Advertise to customers while they are in the purchasing mood — in their cars — passing your station. . . . Bid for the heavy spring and summer gallonage with Cincinnati Globes. . . . Order now — deliveries made when desired. . . . To reproduce your trade design in Cincinnati Globes is an investment, not an expenditure. . . . Write for prices. Inquiries will be promptly handled.

The Cincinnati Advertising Products Co.

1102-1108 York St., Cincinnati, O., U. S. A.

Cincinnati Globes are unequalled for length of service, beauty, strength and master workmanship. They combine sturdy and durable construction with lasting color effects and clean-cut lettering.

CINCINNATI GLOBES

SELL MORE GASOLINE AND OILS

will in all probability evaluate the spirit for antiknock constituents, chemical stability, gum formation tendencies, etc.

The objections to the older systems of analysis of gasoline are many and it has even been fairly well established that towards the usual reagents, such as sulphuric acid and halogens, these series differ only in degree and the reactivities of the groups merge one into another. Naphthene hydrocarbons for example being so closely allied to paraffins in properties are not separated in usual analysis but estimated in mixtures with paraffins by means of aniline points. This method involves the assumption that all naphthenes lower aniline points to the same extent and that all paraffins are miscible with an equal volume of aniline at a temperature of 70° C.

Popular Methods of Analysis

The popular methods of analysis of gasolines as regards unsaturated content are either those depending upon halogen absorption or the use of sulphuric acid. For halogen absorption either bromine or iodine has been employed, each method depending upon the addition of the halogen at the double bond. The chief disadvantages of this method are summarized as follows: (1) the absorption of halogen depends upon concentration of reactants and upon time, (2) the solvents usually present exert a definite action, (3) substitution of halogen is liable to take place side by side with addition.

As regards the effect of substitution of halogen which would give an abnormally high figure for halogen absorption the old method of McIlhiney has found much favor of late as this method registers substitution as well as addition and the two values can be differentiated in the results. A new method due to Francis where bromine is slowly generated by the action of dilute sulphuric acid upon a bromide-bromate solution is also worthy of notice.

The action of sulphuric acid for the removal of olefines from gasoline is one that has been the subject of much recent work. In the past many different concentrations of acid and conditions have been suggested to separate the olefines without action upon the aromatic hydrocarbons.

Chief Trouble Caused by Action of Acid

The chief trouble is due to the formation of spirit soluble polymers of some olefines by the action of this acid. It is doubtful whether any method involving sulphuric acid alone, or slightly diluted, will prove satisfactory. The recent use of acids activated with phosphorous pentoxide open up other possibilities with activators or inhibitors of the sulphuric acid action upon olefines. Various other methods have been put forward for the estimation of unsaturateds and include the action of nitrosyl chloride and sulphur monochloride but these have not reached any stage of popularity.

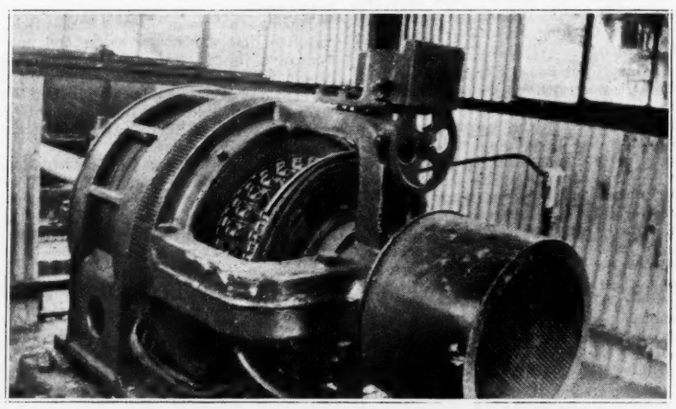
Aromatic hydrocarbons can be estimated by means of 100 per cent sulphuric acid or by means of a nitration mixture, and the use of preferential solvents has been the subject of some work but does not include a method of wide use. In the sulphuric acid method the aniline point of gasoline before and after acid treatment is proportional within limits to the aromatic content but only in complete absence of olefines. Owing to the difficulty of removal of the former preferentially the value of this method is thus affected.

The foregoing account is presented to acquaint the more technical petroleum men of some recent research activities and of the successes and otherwise attendant upon them. The account shows clearly the great value much recent research has proved and will continue to prove in the future, research which will ably serve the refiner in a multiplicity of directions.

USES OF ELECTRICITY IN REFINERY OPERATION

(Continued from Page 169)

circuit breakers between the transformers and the secondary buss system. When the overload circuit breaker on the high side of the normal transformer bank opens, this action automatically opens the breaker on the secondary side of this bank, thus preventing current from feeding back into the defective transformer bank. The oil circuit breakers on the secondary side of the spare bank are manually operated.



G. E. 150-horsepower type BTA variable speed motor at Phillips refinery. This picture was taken before the motor was completely assembled and pilot motor which permits remote control of the speed of motor is not shown. It is to be mounted on the bracket on top of the motor.

The low tension distribution system is under ground and so segregated by automatic oil circuit breakers that a motor or line failure in any part of the refinery will not disturb the operation of the remainder of the plant.

The 3 miles of high tension lines from the power plant to the refinery run through an area thickly dotted with oil derricks which afford some lightning protection in addition to the lightning arrestors at both ends of the line. The low tension distribution system, being under ground, requires no lightning protection.

COLOMBIA'S NEW PRESIDENT

The recent victory of Dr. Enrique Olaya Herrera in the national elections in Colombia is significant. Doctor Herrera conducted his campaign on a platform of avowed friendship for the United States and a promise of close co-operation. It is expected that a new oil law will be passed either at a special session of Congress this spring or at the regular session in the fall which will be satisfactory to foreign oil interests as well as to the government.

IRAK PIPE LINE

Four surveys of a tentative route for the pipe line from Baba Gurgur to the Mediterranean Sea, have been made to Haifa, Beirut, Alexandria and Tropoli. The latter is considered the most feasible and probably the least expensive.

Has your favorite service station man seen this demonstration?

AT the right is the demonstration machine which engineers from the Ethyl Gasoline Corporation take from place to place to prove how Ethyl "knocks out that 'knock'" and develops an engine's maximum power.

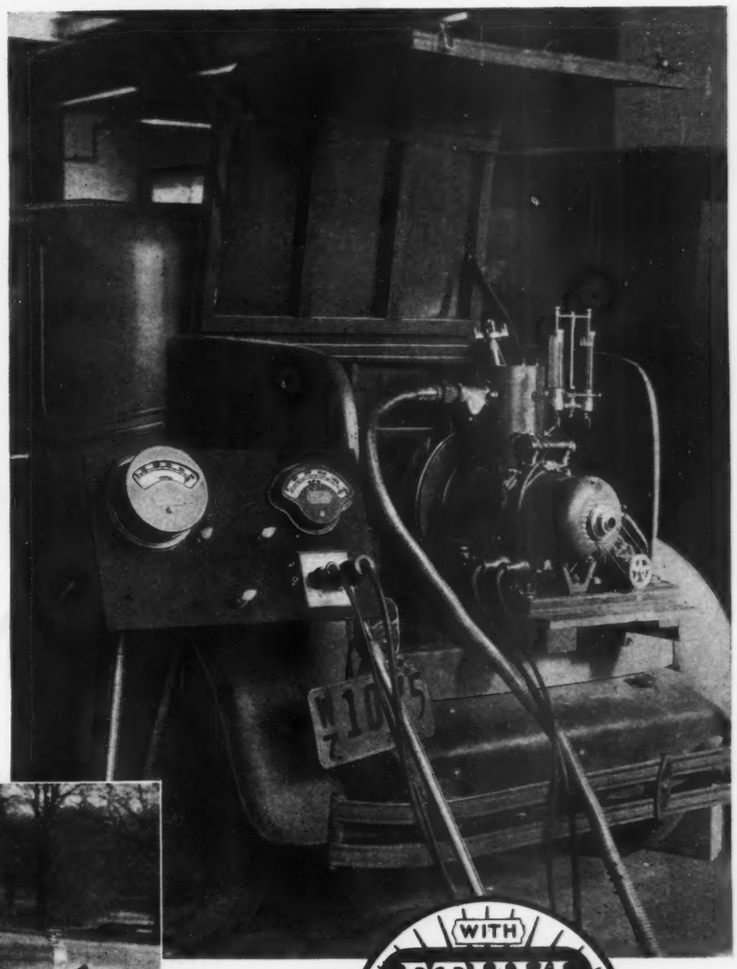
In those two vials at the right of the cylinder is the fuel. One contains ordinary gasoline, the other Ethyl Gasoline.

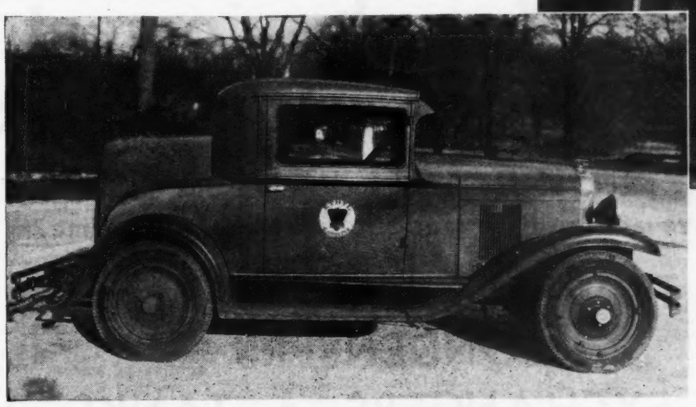
By turning the valve between them, ordinary gasoline flows into the combustion chamber. The engine "knocks"; its speed decreases; the power begins to drop.

Then the valve is turned in the opposite direction to feed Ethyl into the chamber. The engine quiets swiftly. "Knock" goes out. R. P. M.'s (engine revolutions per minute) increase. And the engine delivers the power of which it is capable.

That's why thousands of service station men advise you to use Ethyl in your own car. They know that *any* car performs better with Ethyl Gasoline in its tank.

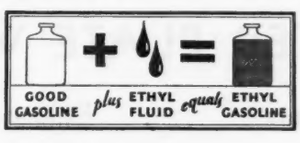
Ethyl Gasoline Corporation, New York City.





Fitted into the rear of this car is the "knock" demonstration machine. (Above at right) The machine ready for action.

WITH ETHYL BRAND OF ANTI-KNOCK COMPOUND ETHYL GASOLINE CORPORATION NEW YORK, U.S.A. Knocks out that "knock"



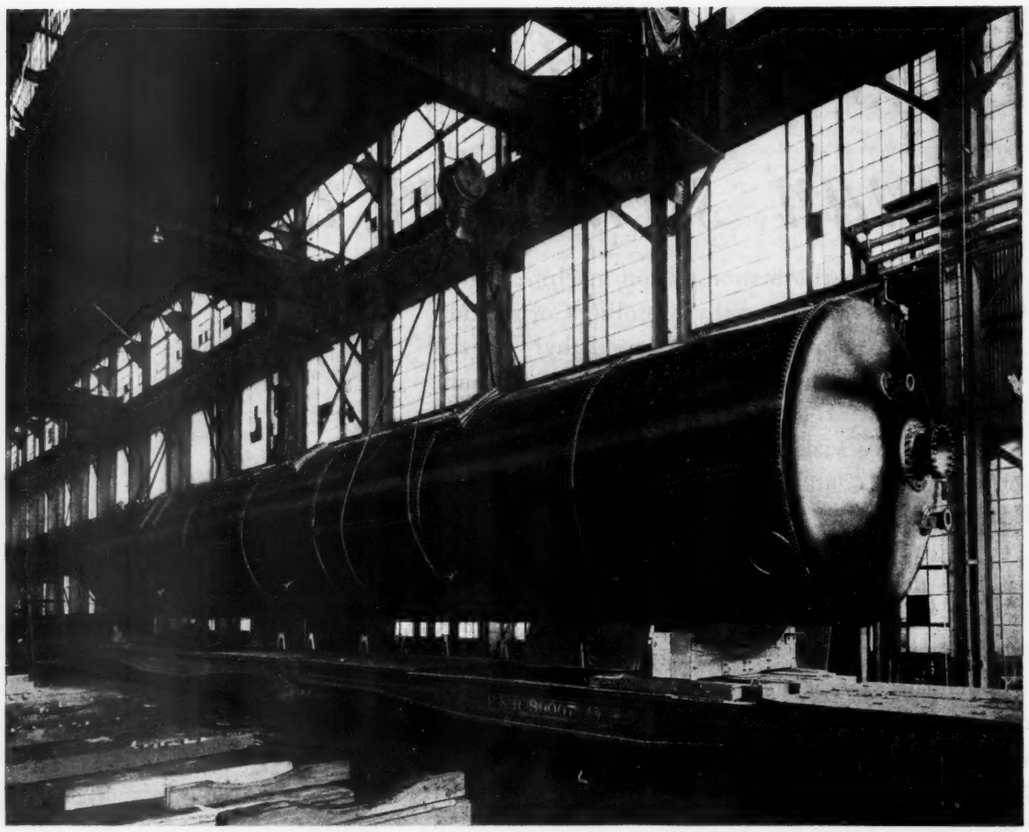
Wherever you drive—whatever the oil company's name or brand associated with it—*any* pump bearing the Ethyl emblem represents quality gasoline of high anti-knock rating.

ETHYL GASOLINE

© E. G. C. 1930

The active ingredient now used in Ethyl fluid is tetraethyl lead.

TOWER
13' 4" Diameter x 95' High
Weight 250,000 lbs.
Handled and shipped in one piece



MASSIVE CONSTRUCTION

Have Your Equipment Built in Shops with Capacity

Many pieces of equipment such as the one illustrated above are built in our shops at the same time.

TOWERS ▪ STILLS
CONDENSERS
HEAT EXCHANGERS ▪ TANKS, etc.
STILL BOTTOMS ▪ ANGLE WORK
FABRICATED PLATE WORK

HIGH PRESSURE HEAT EXCHANGER

Rail or water shipments Estimates on request

SUN SHIPBUILDING & DRY DOCK CO.
CHESTER, PA.

RAOULT'S LAW IN COLUMN CALCULATIONS

(Continued from Page 169)

butane. In other words, the overhead fraction is almost pure propane.

Percentage Composition

Next there can be calculated the percentage composition of the residue (gasoline fraction) in the still. The percentage weights, mols, mol fractions and vapor pressures of the different components in the pentane to octane fraction of the initial mixture introduced into the column are:

	Per cent by wt.	Mol wt.
Pentane	35	72.1
Hexane	30	86.1
Heptane	20	100.1
Octane	15	114.1
	100	

Next the mol fraction of butane giving a vapor pressure of 17 atmospheres at 275° F. is calculated:

$$\text{Mol fraction of butane} = \frac{\text{total V. P.} - \text{V. P. of pentane-octane}}{\text{V. P. of butane} - \text{V. P. of pentane-octane}} = \frac{17 - 7.22}{32.9 - 7.22} = 0.38$$

Since the mol fraction of butane is 0.38, the mol fraction of the pentane to octane fraction is 1.00 — .38 = .62.

The average molecular weight of the pentane to octane fraction is:

Pentane	35 × 72.1 = 2,523
Hexane	30 × 86.1 = 2,583
Heptane	20 × 100.1 = 2,000
Octane	15 × 114.1 = 1,712
	8,818

$$\text{Av. mol wt.} = \frac{8{,}818}{100} = 88.1.$$

The per cent of butane and of pentane-octane are:

	Mol fraction	Mol wts.	Mols × mol wts.	Per cent by wt.
Butane	0.38	58.1	22.1	29.0
Pentane-octane	0.62	88.1	54.6	71.0
	1.00		76.7	100.0

Hence there will remain in the still at 275° F. and 17 atmospheres pressure, 29 per cent by weight of butane and 71 per cent of the pentane to octane fraction.

The per cent of pentane to octane has increased because the propane has left the still. However, butane has disappeared and only a small amount has gone overhead, for the overhead fraction is almost pure propane. The total butane in the still should be approximately 50 per cent. What would happen is that the excess butane would be forced up in the column, condense there and automatically raise the temperature of the top of the column to a point compatible with the temperatures of the still. Hence a lower temperature than 275° F. should be used in the still to retain the butane therein, if this is desired.

Composition Curve

One can draw a boiling point composition curve so as to predict the approximate composition of the still product, or the overhead product, at any temperature desired. Calculations can be made for a series of curves, say 20° F. apart. We shall next try a bottom temperature of 250° F. to determine what the composition of the column residual product is at this temperature, and how compatible it is with the top temperature.

	Per cent by wt.	Mol wt.
Pentane	35	72.1
Hexane	30	86.1
Heptane	20	100.1
Octane	15	114.1
	100	

The mol fraction of butane giving a vapor pressure of 17 atmospheres at 250° F. is:

$$\frac{17 - 5.5}{25 - 5.5} = 0.59 = \text{mol fraction of butane.}$$

The mol fraction of the pentane-octane fraction is 1.00 — 0.59 = 0.41.

The percentage of butane and of pentane-octane are:

	Mol fraction	Mol wts.	Mols × mol wts.	Per cent by wt.
Butane	0.59	58.1	34.3	49.0
Pentane-octane	0.41	88.1	36.1	51.0

Hence a temperature of 250° F. is substantially the required still temperature to keep approximately 50 per cent butane (practically all of the butane) in the still and is compatible with a top temperature of 120° F. to distill propane with 1.6 per cent butane overhead, all at a pressure of 17 atmospheres.

Shortened Method

These calculations represent a round-about method, presented for the purpose of illustrating the full use of Raoult's law to column practice. As a matter of fact it can be shortened considerably. An inspection of the vapor pressure curve of propane shows that 17 atmospheres is not quite enough pressure to reflux back propane at 120° F. and keep all the butane out of the stream, hence some of the latter will be present.

Mols	Mol fractions	Vapor pressure of pure hydrocarbons at 275° F. (atmos.)	Partial pressures at 275° C.
0.485	0.417	11.91	4.97
.348	0.299	5.59	1.67
.200	0.172	2.63	0.45
.131	0.112	1.18	0.13
1.164	1.000		7.22

Hence the top problem in its simplicity becomes one of calculating the mols of liquid and, therefore, the mol per cent of propane and butane to balance a pressure of 17 atmospheres at 120° F. Having the weight per cents of the propane and butane in the overhead mixture these can be subtracted from the original raw product to determine the character of the residual (base) product. Next the mol per cent, partial pressures and total pressures at a particular temperature are determined. Then a line can be drawn through this point and the focal point on the Cox chart, and the proper temperature to use at the base of the column can be obtained to balance 17 atmospheres pressure.

The accuracy of the foregoing calculations depends upon the accuracy of the vapor pressures of the pure compounds, the accuracy with which the analyses of the natural gasoline is made, and the accuracy of Raoult's law itself. Brown and Rogers[1] found that the law can be used in column design in natural gasoline plants where an accuracy of 5 to 15 per cent is not exceeded. The vapor pressure determinations and the analyses of the more important constituents of the natural gasoline probably fall within this range; at least the former do.

Raoult's law calculations are interesting to use to check column performances if all the necessary data are at hand. Usually this is not the case. Usual practice is to set a column approximately in keeping with the base products desired, from past experience, or set it roughly from simple vapor pressure data and then adjust it to make the maximum amount of salable product.

[1]Chem. Met. Eng., 36, 400, 1929.

Mols	Mol fractions	Vapor pressure of pure hydrocarbons at 250° (atmos.)	Partial pressures
0.485	0.417	9.1	3.8
.348	.299	4.6	1.2
.200	.172	2.1	0.4
.131	.112	0.8	0.1
1.164	1.000		5.5

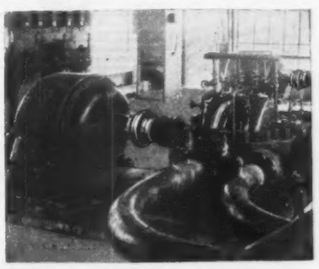
NATIONAL OIL SCOUTS

The National Oil Scouts Association Committee will meet at the Texas Hotel, Fort Worth, March 8 to select a meeting place for this year's convention.

"Can't we forget couplings?"
YES—USE FAST'S COUPLINGS!

COUPLING failures that cause shut-downs for repairs have no place in a modern plant. Ten years ago Gustave Fast simplified the coupling problem by the development of a self-aligning coupling with no flexible pins, bushings, springs, discs or grids. It has revolutionized coupling practice!

This principle of purely mechanical compensation for shaft misalignment has made shut-downs for coupling repairs a thing of the past in thousands of plants.



Oklahoma Pipe Line Company uses Fast's Couplings: Photograph from St. Louis, Okla.

Simple and Effective

In the three sketches below notice how mechanical flexibility is used throughout. See the way every form of misalignment is taken up by the floating sleeve principle. Instead of relying on flexible materials subject to fatigue and probable failure, misalignment is taken up between the gear faces. Oil between the teeth carries the load. Simple, isn't it? No flexible materials are used, nothing to fatigue, nothing to be replaced, nothing to cause a plant shut-down when you are operating at full capacity.

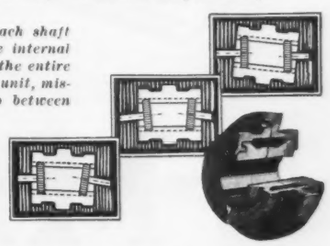
Fast's Couplings become part of the permanent transmission machinery of your plant because when lubricated they function continuously, as long as the connected machines.

Meet Every Condition

Every installation requirement in your industry is met by Fast's design. Unusual and difficult problems are solved by this simple coupling. To get coupling protection in your plant specify Fast's Couplings on all new equipment.

A new 10th Anniversary Catalog has just been published, giving the complete story of Fast's Self-Aligning Coupling and its application in various industries. Mail the coupon today.

Two spur gears, one on each shaft end, mesh in oil with the internal gears of a floating sleeve, the entire assembly revolving as one unit, misalignment being taken up between the gear faces.



GET NEW 10th ANNIVERSARY CATALOG

THE BARTLETT HAYWARD CO.

218 Scott Street, Baltimore, Md.

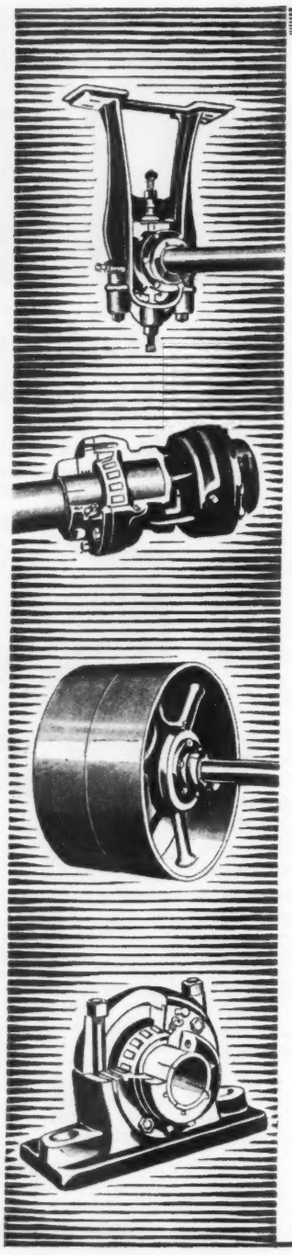
Without obligation, please send me a free copy of the new bound edition of the 10th Anniversary Catalog of Fast's Couplings, as soon as it is off press.

NAME .....

FIRM NAME .....

ADDRESS .....

CITY AND STATE .....



Friction feeds on POWER

SOMEWHERE, friction is wasting your power. It is speeding up depreciation and inviting a breakdown. Yet, such friction IS AVOIDABLE. Eliminate it from your plant and machines with the MEDART TIMKEN-equipped Line of Industrial Applications.

Fully described in our special Bulletin which accompanies **Catalog 43,** with DISCOUNT SHEET FOR PRICING.

THE MEDART COMPANY (Formerly Medart Patent Pulley Company) General Offices and Works, St. Louis, U. S. A. Offices in Chicago, Philadelphia, Pittsburgh, New York, Detroit, Cleveland, Seattle. Office and Warehouse in Cincinnati.

COMPLETE POWER TRANSMISSION EQUIPMENT
INCLUDING

Bearings: Ring Oiling Plain Oiling Timken-equipped.
Pulleys: Cast Iron Steel Rim Wood Hercules all-steel heavy-duty.

Belt Tighteners and Adjusters (all types)	Countershafts	Rope Drives
Friction Clutches	Gearing (complete line)	Pillow Blocks (all types, including Timken-equipped)
Couplings (all types)	Hangers (for Line Shaft Installations of all kinds)	Shafting
	Sprocket Wheels and Chains	Speed Reducers

MANUFACTURERS OF METALLIC BAR FINISHING EQUIPMENT
ENGINEERS AND BUILDERS OF SPECIAL MACHINERY AND EQUIPMENT

MEDART

EVERYTHING IN LINE SHAFTING EQUIPMENT

TIMKEN BEARING EQUIPPED

DRIVE RIGHT
MEMBER OF POWER TRANSMISSION ASSOCIATION

WILDCAT OPERATIONS IN OKLAHOMA

(Continued from Page 66)

J. M. Henry et al's No. 1 Abraham, SE cor. NW, Sec. 4-5-8w ..... Rig.

GRANT COUNTY

Gypsy Oil Co.'s No. 1 Belderbeck, C SE SE, Sec. 27-28-7w. Wilcox 5,647 ft.; drlg. 5,760 ft.
Baucher et al's No. 1 Deadman, SW SE, Sec. 12-28-4w.. Shut down 4,737 ft.
Cowden et al's No. 2 Vollmer, CEL NE SW, Sec. 22-25-4w. Shut down 5,640 ft.
Otstot's No. 1 Tabor, C NE NE SE, Sec. 23-26-3w..... Drlg. 3,710 ft.

GARVIN COUNTY

Nelson et al's No. 1 Strickland, NE SW, Sec. 10-4-3..... Shut down 109 ft.
Pickham-Harris' No. 1 Community Gaines, C NW NE, Sec. 11-4-1 ..... Drlg. 3,030 ft.

GREER COUNTY

Helmerich & Payne's No. 1 Henck, NW cor. Sec. 23-6-24w ..... Fishing 2,240 ft.
I. T. I. O. et al's No. 1 Fee, C SW NE, Sec. 17-6-24w..... Shut down 2,100 ft.

HARMON COUNTY

Harmon-Tex Oil Co.'s No. 1 Hoadley, NE cor., Sec. 17-4-24w ..... Shut down 700 ft.
S. M. Stauffer's No. 1 Castleman, SW NE, Sec. 8-4-26w.. Shut down 625 ft.

HARPER COUNTY

Empire's No. 1 Bruce, C NE SW, Sec. 12-25-20w..... Rig.
Sinclair Oil & Gas Co.'s No. 1 Howell, C SW SW, Sec. 14-26-24w ..... Drlg. 7,320 ft.

HASKELL COUNTY

Mid-Western's No. 1 Posester, C NE SE, Sec. 33-10-22.. Spudding.
Holden's No. 1 Phillip, SE cor. Sec. 3-9-18e ..... Shut down 1,860 ft.
Marion Oil's No. 1 Sanders, NW NE SW, Sec. 10-9-18e.. Shut down 2,387 ft.
Sanboise Gas' No. 1 Unknown, SW NW SE, Sec. 32-9-21e.. Shut down 2,100 ft.

HUGHES COUNTY

Wright et al's No. 1 Ott, SE SW, Sec. 15-5-11..... Rig.
Canady et al's No. 1 Kanard, NW SW, Sec. 29-9-12..... 1,000,000 ft. gas 2,284-90 ft.; total depth 2,815 ft.; shut down.
Irwin et al's No. 1 Jones, SE NW, Sec. 30-5-10..... Rig on ground.

KAY COUNTY

Skelly and Empire's No. 1 Maple, SW cor., Sec. 20-27-4.. Drlg. 510 ft.

KINGFISHER COUNTY

Superior Oil Co.'s No. 1 Story, SE cor., Sec. 25-19-5w.... Fishing 6,285 ft.
Galt Brown's No. 1 Wolf, NW SE, Sec. 6-16-7w..... Shut down 6,015 ft.

KIOWA COUNTY

Merrick Oil Co.'s No. 1 Kelly, NW cor. SE, Sec. 20-7-17w. Shut down 1,525 ft.

LEFLORE COUNTY

Red Bank Oil Co.'s No. 1 Fee, SE SW NW, Sec. 23-9-24.. Total depth 5,440 ft.; 15,000,000 ft. gas; fishing 5,488 ft.

LATTIMER COUNTY

Limestone O. & G. Co.'s No. 1 Shaw, NW cor. NE NW, Sec. 23-5-18e ..... Underreaming 1,700 ft.

LOGAN COUNTY

Currier's No. 1 Young, C SW NE SW, Sec. 34-17-4w.... Rig.
Haley & Smith's No. 1 Guier, SE cor. SW, Sec. 33-18-3w. Shut down 3,970 ft.

McCLAIN COUNTY

Sunray Oil's No. 1 Newsome, C SE NE NE, Sec. 16-5-3.. Fishing 3,710 ft.

McINTOSH COUNTY

T. C. Young's No. 1 Derrison, Sec. 3-12-15 ..... Shut down 1,275 ft.
Jennings Brothers' No. 1 Crabtree, NW SW NE, Sec. 31-10-14 ..... Drlg. 4,300 ft.
Patterson et al's No. 1 Smith, SW cor. NW SE, Sec. 32-9-16 ..... Shot 240 qts. 5,446-5,559 ft.; shot went off up hole; fishing.

MUSKOGEE COUNTY

Sioux Oil Co.'s No. 1 Unknown, NW SE, Sec. 21-11-19.. Shut down 1,011 ft.

NOBLE COUNTY

Gypsy Oil Co.'s No. 1 Bergstrom, SE NE, Sec. 28-22-1w.. Rig.
Peerless et al's No. 1 Wentz, NW SW, Sec. 22-22-1..... Drlg. 3,279-3,310 ft.; flowed 110 bbls.

OKFUSKEE COUNTY

Irwin et al's No. 1 Davis, SE NW, Sec. 16-13-9..... Drlg. 450 ft.
Henry Oil Co.'s No. 1 Harjo, Sec. 36-12-9..... Shut down 2,795 ft.
E. L. Robinson's No. 1 Rice, NW, Sec. 2-10-9..... Location.
Shepard et al's No. 1 Neveas, SE NW SW, Sec. 3-12-10.. Shut down 3,661 ft.

OKLAHOMA COUNTY

Warr et al's No. 1 Castle, SW NW, Sec. 20-11-3w..... Location.
J. F. Cuniff, trustee's No. 1 Church Land, NE SW SE, Sec. 17-12-4w ..... Drlg. 3,260 ft.
Magnolia and Ramsey's No. 1 Johnson, C NE SW, Sec. 35-13-3w ..... Drlg. 4,570 ft.
Ryan Consolidated's No. 1 Lawton, NE NW, Sec. 3-11-2w. Drlg. 4,715 ft.
Tom Slick Oil Co.'s No. 1 Martin, C NW NW, Sec. 13-13-1w ..... T. D. 6,971 ft.; water; plugging back 6,871 ft.
Hall & Briscoe's No. 1 Holmes, NE cor. SW SE, Sec. 10-11-3w ..... Drlg. 4,227 ft.

OSAGE COUNTY

Kay County Gas' No. 1, C N half NE, Sec. 28-24-4..... Drlg. 800 ft.
Continental Oil Co.'s No. 1, NW SE SE, Sec. 24-24-5..... Drlg. 1,620 ft.

PAWNEE COUNTY

Shaffer O. & R. Co.'s No. 1 Jones, SW NE, Sec. 22-20-5.. Location.
Cochran et al's No. 1 Green, NE cor. SW, Sec. 15-23-5... Rig.

PITTSBURG COUNTY

Empire O. & R. Co.'s No. 1 Williams, C NE SE, Sec. 33-7-16e ..... Shut down 3,975 ft.
Kerr & Koy's No. 1 Hall, C NW NW, Sec. 32-4-12..... Abandoned 3,502 ft.

POTTAWATOMIE COUNTY

Keister & Manning's No. 1 Rowlett, SW SE NE, Sec. 30-8-4 ..... Drlg. 4,468-80 ft.; 216 bbls. in 14 hours.
Payne Drlg. Co.'s No. 1 Bullock, SE NE, Sec. 22-6-3..... Drlg. 3,990 ft.

ROGER MILLS COUNTY

Bucy & Stone's No. 1 Williams, C SW, Sec. 23-12-24w... Drlg. 600 ft.
L. C. Hivick's No. 1 Davis, C NW NE, Sec. 4-11-26w.... Drlg. 2,840 ft.

SEMINOLE COUNTY

Magnolia and Twin State Oil Co.'s No. 1 Killcrease, NW NE NE Sec. 8-5-6 ..... Location.
Producers & Refiners' No. 1 Factor, NW SW, Sec. 30-6-6. Spudding.
Independent Oil & Gas Co.'s No. 1 Johnson, C NE NE, Sec. 33-9-8 ..... Spudding.
Prairie Oil & Gas Co.'s No. 1 Anders, NW cor., Sec. 23-6-6 ..... Drlg. 1,540 ft.
Superior Oil Co.'s No. 1 Morgan, SE cor., Sec. 19-6-6..... Drlg. 1,850 ft.
Magnolia's No. 1 Webster, NE SE NW, Sec. 31-6-8..... 120 bbls. 12 hours 2,656-71 ft.
Sunray Oil Co.'s No. 1 Sunday, NW SE, Sec. 35-5-5..... Location.

WASHITA COUNTY

Southern Inv. Co.'s No. 1 Musie, NW cor. Sec. 10-9-20w.. Location.

WOODS COUNTY

Peerless O. & G. Co.'s No. 1 Crowell, C NW NE Sec. 23-28-16w ..... Drlg. 4,320 ft.
Gypsy-Prairie et al's No. 1 Thompson, SE cor. SW, Sec. 10-25-15w ..... Fishing 6,104 ft.
Sinclair Oil & Gas Co.'s No. 1 Showwalter, C SW SW, Sec. 33-27-16w ..... Fishing 6,739 ft.

WOODWARD COUNTY

Farrond et al's No. 1 Unknown, SE cor. SW SE, Sec. 2-23-17w ..... Shut down 1,387 ft.
Prairie Oil & Gas et al's No. 1 Wilbur, NE cor. NW, Sec. 22-23-17w ..... Drlg. 6,125 ft.
Billy's Oil Co.'s No. 1 Watt, C SE, Sec. 9-23-20w..... Drlg. 5,560 ft.
Burgoyne Brothers' No. 1 Merkins, SW cor. SE NE, Sec. 15-21-19w ..... Shut down 1,910 ft.

SOUTHERN OKLAHOMA

ATOKA COUNTY

Bryant-Croxton's No. 1 Mason, NW NE NW, Sec. 4-1s-14. Shut down 1,560 ft.
Bookshire's No. 1 Guinn, NW cor., Sec. 18-3s-10..... Shut down 100 ft.

BRYAN COUNTY

Johnson et al's No. 1 Ussery, SE SW SE Sec. 14-6s-7e... Location.

The world's largest pumping well

Excerpt from The OIL WEEKLY

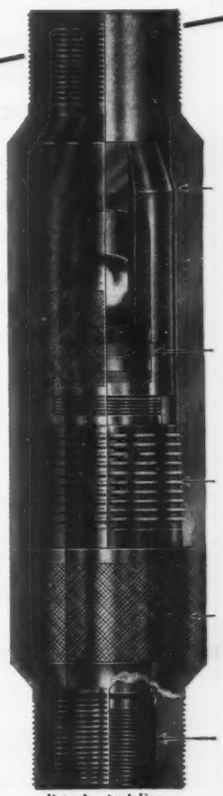
Issue of December 27, 1929, Page 32

"The biggest pumping well in the world, so it is claimed, is located in the Lea area, New Mexico, nine miles south and 25 miles west from Hobbs. It is owned by Cranfill & Reynolds of Dallas, and is known as Statelands 1-B, located in Section 2-21-33, at a point 3300 feet from the north line and 660 feet from the east line of the section. Although this well encountered only five feet of pay at 3750 to 3755 feet and has no gas pressure to make it flow, it is pumping 2100 barrels of 31° oil per day. It is being operated by standard rig, with four-inch tubing, and three and three-quarters inch working barrel, at a speed of 17 to 20, 72 inch strokes per minute."

THIS remarkable well is equipped with a 4-inch Petro Oversize Standing Valve and Nu-Alloy Balls and Seats—this service record is in keeping with the reputation Petroleum Equipment Company products have so justly earned for pumping equipment that delivers constant and uniform performance. Our field representatives who are pumping equipment specialists are at your service.

Immediate Shipment

Within two hours after your order is received, your supply store can secure immediate shipment of Nu-Alloy Balls and Seats. *Branches:* Tulsa, El Dorado, Houston, Coffeyville. *Headquarters and Plant:* Fort Worth, Texas.



Pat. Applied For

Petroleum Equipment Co.

FORT WORTH, TEXAS

JON R. LONG, *Manager* *Plant and Office:* Fort Worth, Texas

Made to Speed Up Heavy Work

TO secure the high clutch efficiency needed for modern rotary drilling, and for operating the countershafts of large draw works generally, we developed a special type of toggle action clutch, of which the 42″ clutch shown above is the best known example.

This clutch has a capacity of over 400 H.P. per 100 r.p.m. It is designed to start capacity loads smoothly and carry them so long as the job may require. It has been instrumental in speeding up considerably the heavy work incident to modern methods of deep well drilling.

We shall be glad to furnish detailed engineering data on these highly efficient clutches. A request for information puts you under no obligation.

Whatever your clutch needs may be, write.

TWIN DISC CLUTCH COMPANY

RACINE WISCONSIN

TWIN DISC CLUTCHES

Slab Oil Co.'s No. 1 Ryle, NW SE SE, Sec. 27-6s-7.....Spudding.
Marshall's No. 2 Fee, C SW SE NW, Sec. 26-5s-7.....Shut down; 6-in. csg. 265 ft.
Yale Oil Syndicate's No. 1 Craige, C NW NE, Sec. 36-9s-9e .....Drlg. 230 ft.

CARTER COUNTY

Campen-Lasater Co.'s No. 1 Anderson, NE cor. SE NE SE, Sec. 32-4s-2 .....Cleaning out 1,980 ft.

CHOCTAW COUNTY

Choctaw Petroleum Co.'s No. 1 Wilson, SW cor. SW, Sec. 15-6-19e .....Shut down 1,346 ft.

COMANCHE COUNTY

Pelwin Oil Co.'s No. 1 Tafepirdy, C NW NE NE, Sec. 5-1s-9w .....Location.

COTTON COUNTY

Empire O. & R. Co.'s No. 1 Chambers, NW SE, Sec. 8-3-9w .....Rig.
American Ref. Co.'s No. 1 Miller, SE SW, Sec. 9-5s-12w..Shut down 2,158 ft.
T. Medlin's No. 1 Johns, SW SE, Sec. 8-2s-9w .....Drlg. 2,090 ft.

JEFFERSON COUNTY

Roy Johnson's No. 1 Pettett, NE cor. Sec. 10-4s-4w ....Drlg. 1,000 ft.
Hart's No. 1 Standfield, C W half NE SE, Sec. 33-7s-6w.Drlg. 867 ft.

JOHNSTON COUNTY

N. A. Neff's No. 1 Chapman, C SW NW, Sec. 20-4s-5.....Location.

LOVE COUNTY

Gilcrease Oil's No. 1 Burkheart, NE NW, Sec. 13-6s-1...Location.

MARSHALL COUNTY

Golden Rule Oil Co.'s No. 1 Reeves-Gray, C NW SE NE, Sec. 19-6s-6 .....Drlg. 380 ft.

McCURTAIN COUNTY

Milton et al's No. 1 Vase, SW NW, Sec. 26-6s-21.....Drlg. 2,287 ft.

STEPHENS COUNTY

Wirt Franklin Petroleum Corp.'s No. 1 McPhail, NW SE, Sec. 1-2s-7w .....Spudding.
Smythe et al's No. 1 Johnson, NE cor., Sec. 30-2-8w....Swabbing 2,476-87 ft.

TILLMAN COUNTY

Flake's No. 1 Barba, NE SE NE SE, Sec. 19-1s-16w....Drlg. 500 ft.
Allen Brothers' No. 1 Howell, SW NE, Sec. 13-1-17w....Shut down 775 ft.
Nance et al's No. 1 Massie, NE NW, Sec. 36-18-6w.....Location.
Landfair et al's No. 1 Smith, SE SW SE, Sec. 6-2s-16w..Shut down 2,535 ft.

WILDCAT OPERATIONS IN KANSAS

(Continued from Page 70)

E. N. Morgan's No. 1 Whithair, NW SE Sec. 9-12-1 ....Drlg. 1,325 ft.

DOUGLAS COUNTY

Steinbuckel's No. 1 Unknown, SW NE NW Sec. 34-14-21..Drlg. 400 ft.
Jenkins & Scott's No. 1 Haden, SE NW Sec. 10-12-17 ....Shut down 550 ft.

EDWARDS COUNTY

Skelly's No. 1 Johnson, NE SW Sec. 21-26-17w .....Drlg. 4,200 ft.
Barnsdall Oil's No. 1 McCarty, NW NE Sec. 31-25-17w..Drlg. 4,035 ft.
Dixie & Amerada's No. 1 McCarty, SW cor. Sec. 22-25-17w .....Drlg. 4,000 ft.

ELK COUNTY

H. F. Fleming's No. 1 Shered, NW cor. Sec. 16-29-9 ....Drlg. 1,475 ft.
Empire and Arkansas Fuel's No. 1 Record, C NW NE SE Sec. 32-30-10 .....P. B. to 1,270-1,300 ft.

ELLIS COUNTY

Central Commercial Oil Co.'s No. 1 Helms, SE cor. NE Sec. 2-12-20w .....Location.
Phillips Pet. Co.'s No. 1 Clinton, SE NW Sec. 5-12-17w..Drlg. 225 ft.
Streeter & Stearns' No. 1 Leiker, SW NE Sec. 26-12-20w..Shut down 1,290 ft.
Byrene et al's No. 1 Fisher, NW SE Sec. 4-11-20w ....Shut down 1,000 ft.
Rush Oil Co.'s No. 1 Gatewood, NW cor. NW Sec. 4-15-20w .....Drlg. 2,765 ft.

ELLSWORTH COUNTY

Tatlock et al's No. 1 Sackem, C SW SE Sec. 25-17-9w ..Drlg. 3,228 ft.

FORD COUNTY

McNabb et al's No. 1 Fowler, C SE Sec. 26-27-22w ....Shut down 400 ft.
Swain et al's No. 1 Kenthorne, C NW Sec. 21-25-24w ..Shut down 845 ft.

GRAHAM COUNTY

Gulf Coast Oil Co.'s No. 1 Johnson, C S half Sec. 27-8-25w.Shut down 4,340 ft.
Naylor et al's No. 1 St. John, NW SE SE Sec. 27-8-25w ..Rig.

GREENWOOD COUNTY

Ward & McGinnis' No. 1 Henley, SW NE Sec. 23-25-9 ..Abandoned 2,208-28 ft.; water.
F. Konkay et al's No. 1 Rock, NW NE NE Sec. 7-27-12..Drlg. 985 ft.

HARPER COUNTY

Beeler et al's No. 1 Bear, C NE Sec. 21-31-6w .....Shut down 1,830 ft.

HARVEY COUNTY

Superior's No. 1 Regier, SE NW Sec. 11-22-3w .....Drlg. 3,610 ft.
Liggett et al's No. 1 Regier, C SE NW SE Sec. 2-23-3w..Drlg. 3,522 ft.
E. W. Marland, Inc.'s No. 1 Neiman, C NE SE NE Sec. 8-24-2 .....Abandoned 3,410-40 ft.; water; total depth 3,511 ft.
Mrs. Gay et al's No. 1 Grove, C NW NE NW Sec. 29-23-1w .....Cleaning out 3,360 ft.

HODGEMAN COUNTY

Phillips Pet.'s No. 1 Hausman, NW NE Sec. 30-22-22w ..Underreaming 4,995 ft.

KINGMAN COUNTY

White Eagle's No. 1 Lorenz, C NE SW SE Sec. 25-27-5w..Silicious lime 4,255-62 ft.; water; abandoned.

LYONS COUNTY

Sheedy et al's No. 1 Evers, C NE SE NE Sec. 4-21-10....Rig.
Sheedy et al's No. 1 Reese, SW SE Sec. 16-20-10 .....Shut down 1,200 ft.

MARION COUNTY

Empire O. & R. Co.'s No. 1 Black, C NE NW SW Sec. 27-19-2 .....Drlg. 2,602 ft.
Marshall et al's No. 1 Higgins, NE cor. Sec. 33-19-5 ....Rig.

McPHERSON COUNTY

Galt-Brown et al's No. 1 Zeitlow, C NE SE SE Sec. 7-17-1w .....Underreaming 1,580 ft.
Dixie Oil Co.'s No. 1 Johnson, SW cor. Sec. 20-17-3w ....Drlg. 2,920 ft.
McCulloch Oil Co.'s No. 1 Cornelius, SW cor. Sec. 7-21-4..Drlg. 3,850 ft.
Kansas Oil Co.'s No. 1 Otto, SW NW Sec. 21-20-1w ....Fishing 3,480 ft.
Milmac's No. 1 Decker, NW cor. Sec. 11-20-3w .....Shut down 1,472 ft.

MORTON COUNTY

Mangle et al's No. 1 Youngren, C SE NW Sec. 24-32-42..Spudded; shut down.

MORRIS COUNTY

Urschell et al's No. 1 Scott, NE NW Sec. 6-16-6 .....Drlg. 1,940 ft.

NORTON COUNTY

Richards et al's No. 1 Colby, Sec. 17-4-21w .....Rig.

OSBORNE COUNTY

Phillips Pet. Co.'s No. 1 Grieve, NW SE NE Sec. 6-7-12w.Abandoned 4,384-85 ft.; water.

PAWNEE COUNTY

Prairie O. & G. Co.'s No. 1 Black, SW NE NE Sec. 11-20-18w .....Drlg. 3,835 ft.

PRATT COUNTY

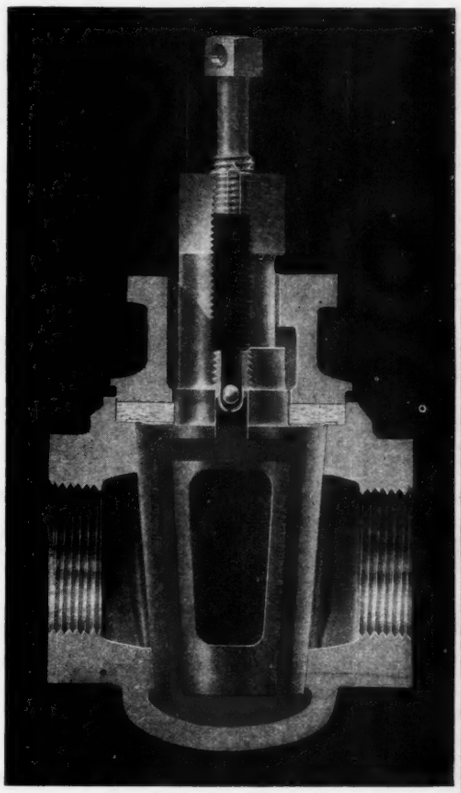
O'Haver & Jones' No. 1 Garacke, C NE SW Sec. 7-26-14w .....Drlg. 4,040 ft.
Wilcox O. & G. Co.'s No. 1 Bappin, SW NW Sec. 7-26-15w .....Fishing 2,785 ft.

RENO COUNTY

M. M. Valerius' No. 1 Stevens, C NE SE NE Sec. 6-26-7w .....Rig on ground.
Wilcox O. & G. Co.'s No. 1 McPheeters, SW NW Sec. 22-26-8w .....Drlg. 3,935 ft.
Witt's No. 1 Olsen, C SE NW Sec. 14-22-6w .....Drlg. 3,185 ft.
Skelly Oil Co.'s No. 1 Birkett, NE NW Sec. 30-24-7w ....Wilcox sand 4,172-96 ft.; water; shut down; total depth 4,247 ft.

RICE COUNTY

Tatlock et al's No. 1 Ploog, C SW SE Sec. 33-18-9w ....Rig.
Burgher's No. 1 Fair, C SE NE NE Sec. 14-21-10w ....Drlg. 2,656 ft.
Derby Oil Co.'s No. 1 Johnson, C NW NE SE Sec. 24-20-6w .....Underreaming 8-in. csg. 3,125 ft.



NORDSTROM VALVES

★ WINNING SLOGANS for NORDSTROM VALVES Announced . . . .

First Award ($250.00)

Nordstrom—The Perfect Application of a Principle
Submitted by J. L Pillow, *Standard Oil Co of La., Baton Rouge, La*

Second Award ($100.00)

Hydraulic Lubrication Insures Effective Manipulation
Submitted by G. E Genung, *13326 Terry Ave., Detroit, Mich*

Third Award ($50.00)

Fabricated and Lubricated for Long Life
Submitted by G. C. Bemis, Jr., *American Smelting & Refining Co., Santa Barbara, Chihuahua, Mexico*

Fourth to Eighth Awards ($10.00 Each)

Won't Leak, Won't Stick, Lubrication Does the Trick
Submitted by T. S. Barlow, *501 East 21st St., New York City*

The Valve Controls the Flow, the Screw Controls the Valve
Submitted by Henry A. Webber, *2331 Donald St., Ames, Iowa*

The Turn of a Screw Pushes Lubricant Through
Submitted by Hal D. Draper, *Asso. Prof. of Chem., State Teachers' College, Fresno, Calif.*

Nordstrom's Perfection Is Your Protection
Submitted by Russell Egbert, *Box 433, Marcus Hook, Pa.*

Eighth to Twentieth Awards ($5.00 Each)

For Those Whose Goal Has Been Control
Submitted by Arthur Atkins, *1055 Green St., San Francisco, Calif.*

Nordstrom's Lubricated Action Is the "Seal" of Satisfaction
Submitted by S. St. Claire, *308 Oakland Ave., Oakland, Calif.*

Bringing Pressure to Bear on Valve Troubles
Submitted by Albert S. Eggleton, *781 Ocean Ave., Brooklyn, N. Y.*

Will Stand the Strain on Any Main
Submitted by Fred J. Maples, *Box 368, Morris, Okla., c/o O. N. G. Corp.*

Simple to Lubricate, Easy to Operate
Submitted by G. W. Martindale, *2254 Whitney Ave., Niagara Falls, N. Y.*

They Lubricate As They Operate
Submitted by Edith M. Bell, *1229 Boardwalk, Atlantic City, N. J.*

Loosened and Tightened by Lubricant
Submitted by L. D. Nicolson, *1345—30th St., N. W., Washington, D. C.*

Where Nordstroms Go In Troubles Go Out
Submitted by E. J. Shaunce, *146 No. 79th St., Highland Park (Upper Darby), Pa.*

With Every Connection Comes Your Protection
Submitted by C. G. Schram, *1322 S. Wabash Avenue, Chicago, Ill.*

Once Installed Never Stalled
Submitted by Charles W. Smith, *3736—26th Ave. West, Vancouver, B. C.*

Made Their Way By the Way They're Made
Submitted by E. D. Murphey, *Box 487, West Tulsa Station, Tulsa, Okla.*

Satisfaction at Every Turn
Submitted by Clair Wilkes, *Scio, Ore.*

★ **12,278**

Slogans entered in the contest recently conducted by the Merco Nordstrom Valve Company were carefully analyzed by the Jury of Awards. We take this opportunity to thank the many contestants for their contributions.

MERCO NORDSTROM VALVE CO.

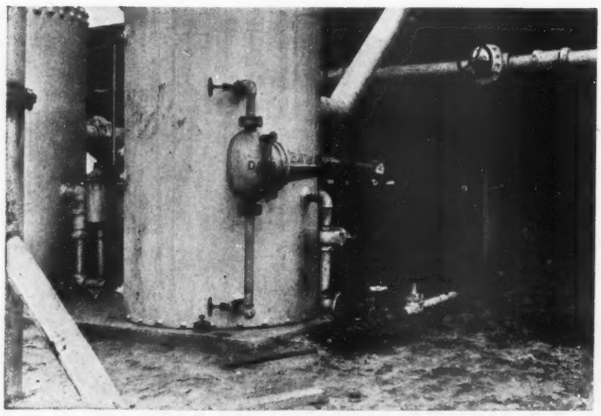
SUBSIDIARY OF THE MERRILL COMPANY

Engineers—Manufacturers

Atlanta—Healey Bldg.; Boston—184 Boylston St.; Buffalo—Genesee Bldg.; Chicago—176 W. Adams St.; Dallas—Magnolia Bldg.; Detroit—2842 W. Grand Blvd.; El Paso—111 S. Virginia St.; Houston—Petroleum Bldg.; Los Angeles—556 S. San Pedro St.; New Orleans—Masonic Temple Bldg.; New York—11 W 42nd St.; Pittsburgh—Clark Bldg.; San Francisco—343 Sansome St.

Agencies in Principal Cities

Factories: Oakland, California and Belleville, New Jersey; Canadian Manufacturers—Peacock Bros., Ltd., Montreal, Cobalt, Winnipeg, Vancouver; England—Audley Engineering Co., Ltd., Newport, Shropshire; Buenos Aires, Argentine—General Electric, Soc. Anon., Victoria 618 Esq. Peru.



Davis Float Box Control is entirely outside this accumulating tank

This simple, accurate control of fluid level in tanks and receivers brings all the control mechanism outside the tank where it is accessible. In the Davis Float Box the action is visible, the operation may be hand tested, the movable assembly may be balanced by counterweight to handle oil of any gravity. A large float gives ample power to operate the control valve. Facilities for inspection without disturbing the piping is a feature.

The Davis Float Box may also be had with remote control mechanism for conditions where the control valve is located at a distance from the tank.

Send for catalog No. 11 describing the full line of Davis automatic pressure control equipment.

G. M. DAVIS REGULATOR COMPANY
409 Milwaukee Avenue,
CHICAGO, ILLINOIS

WESTCOTT & GREIS, Inc.
Sales Engineers
TULSA LOS ANGELES DALLAS

Automatic valve makers for over fifty years

DAVIS VALVE SPECIALTIES

O&GJ 3-6 Gray

Danciger et al's No. 1 Bell, C SW Sec. 16-19-8w ..... Drlg. 2,995 ft.
McCullough et al's No. 1 Williams, C NE Sec. 35-20-8w .. Spudding.

RILEY COUNTY

Grey et al's No. 1 Smith, NE SE Sec. 30-6-6 ..... Shut down 1,970 ft.
Derby & Shaw's No. 1 Lindstrom, NE cor. Sec. 32-7-5e .. Shut down 2,245 ft.

ROOKS COUNTY

A. H. Kruger's No. 1 Steis, NW SE SW Sec. 12-9-16w ... Shut down 570 ft.

RUSH COUNTY

Danciger Oil & Refining Co.'s No. 1 Nave, NW cor. Sec. 26-17-17w ..... Total depth 3,606 ft.; shut down.
Milmac's No. 1 Mohr, C NW Sec. 11-18-16w ..... Drlg. 2,210 ft.

RUSSELL COUNTY

Gilbreath et al's No. 1 Bratton, C NE Sec. 33-11-13w .... Rig.

SEDGWICK COUNTY

Tavender et al's No. 1 McLean, SE SW SE Sec. 23-26-1w ..... Drlg. 250 ft.
McCullough Oil Co.'s No. 1 Buckles, NW cor. SE Sec. 3-28-1w ..... Shut down 1,115 ft.

SHAWNEE COUNTY

Jenkins & Scott's No. 1 Sherman, NW NE Sec. 28-10-15 ..... Shut down 985 ft.
Jenkins & Scott's No. 1 Haden, NE SE Sec. 8-12-14 .. Shut down 750 ft.

SHERIDAN COUNTY

Mandalin O. & G. Co.'s No. 1 Unknown, C SE SW SW Sec. 27-7-26w ..... Spudded; shut down.

STAFFORD COUNTY

Gibson's No. 1 Mueller, C SW Sec. 11-23-14w ..... Drlg. 3,600 ft.

STEVENS COUNTY

Argus Oil Co.'s No. 1 Armstrong, CNL S half NW Sec. 16-34-39w ..... Rig.
Argus Oil Co.'s No. 1 Parker, C SW Sec. 19-34-36w .... Rig.
Argus Oil Co.'s No. 1 Smith, C SW Sec. 13-33-37w ..... Drlg. 577 ft.
McNabb et al's No. 1 Ramey, C SW Sec. 1-33-38w ..... Shut down 1,186 ft.
Argus Gas Co.'s No. 1 Hobbe, C SE Sec. 17-32-37w ..... Drlg. 2,500 ft.
W. Sidwell et al's No. 1 Kelly, SW cor. NE Sec. 16-34-38w ..... Shut down 1,600 ft.

SMITH COUNTY

Phillips Pet.'s No. 1 Clydesdale, SE NW Sec. 23-5-14w .. Drlg. 4,124-28 ft.; water; total depth 4,184 ft.; abandoned.

SUMNER COUNTY

Hatfield's No. 1 Dauber, NE cor. Sec. 18-30-1w ..... Shut down 50 ft.
Kingwood Oil Co.'s No. 1 Stayton, C NE Sec. 18-31-2w .. Chat 3,845-70 ft.; show oil; total depth 4,361 ft.; shut down.
Slick et al's No. 1 Peasel, NW cor. Sec. 33-31-1w ..... Chat 3,651-59 ft.; averaged 85 bbls. daily last week.
Lario O. & G. Co.'s No. 1 Osborne, NE SE Sec. 21-30-1w ..... Chat 3,590-3,605 ft.; water; drlg. 3,892 ft.
E. K. Carey and Laredo Oil Co.'s No. 1 Welsch, SW SE Sec. 9-34-1e ..... Drlg. 3,772 ft.
Davidson et al's No. 1 Strickland, SW cor. SE Sec. 12-35-1w ..... Rig.

TREGO COUNTY

Dixie and Amerada's No. 1 Reitmayer, C NE NE Sec. 19-14-21w ..... Drlg. 3,030 ft.
Prairie Oil & Gas Co.'s No. 1 Kutina, C NE SW NE Sec. 29-15-21w ..... Underreaming 4,285-90 ft.; water.
Phillips Pet. Co.'s No. 1 Spitz, SE cor. Sec. 24-12-25w .. Estimated 15 bbls. 4,160-65 ft.; total depth 4,670 ft.; abandoned.
Day et al's No. 1 Gugler, SW NE NE Sec. 36-12-21w .. Shut down 50 ft.
Day et al's No. 1 Unknown, NE NW SW Sec. 2-11-21w .. Drlg. 3,649 ft.

WASHINGTON COUNTY

McCool & Vincent's No. 1 Linn, NW cor. NE Sec. 27-4-3 .. Wilcox 3,160-65 ft.; water; total depth 3,167 ft.; abandoned.

WOODSON COUNTY

Derby & Spencer's No. 1 Kingon, CNL SE NW Sec. 29-23-15 ..... Rig.
Oko Oil Co.'s No. 1 Hougland, SW NE NE Sec. 2-24-14 .. Drlg. 750 ft.

WILDCAT OPERATIONS IN NEBRASKA

FRANKLIN COUNTY

U. R. Drlg. Co.'s No. 1 Brunkle (twin well), C NW SW NE Sec. 2-3n-13w ..... Rig.

CHASE COUNTY

Chase Pet. Co.'s No. 1 Ingold, C NE Sec. 24-6n-38w .... U.R. 5-in. csg.; T.D. 4,265 ft.

FURNAS COUNTY

Southwestern Pet. Corp. of Nebraska's No. 1 Montague, SE SW SW Sec. 28-1n-22w ..... Shut down 1,750 ft.
Graham Bros.' No. 1 Edwards, NW SW Sec. 13-2n-22w .. Shut down 3,250 ft.

RICHARDSON COUNTY

Norton et al's No. 1 Hauser, NE cor. Sec. 26-1-14 ..... Location.

ROCK COUNTY

North Central Dev. & Drlg. Co.'s No. 1 Leonard, SE cor. NE Sec. 14-32-18w ..... Drlg. 900 ft.

WEBSTER COUNTY

Mid-Kansas Exploration Co.'s No. 1 Platt, C SE one-half Sec. 3-1n-11w ..... Shut down 555 ft.

VENEZUELAN PRODUCTION REPORT; SOUTH AMERICAN OIL OUTPUT

NEW YORK, Mar. 3.—Production of crude oil in Venezuela for January totaled 11,518,273 bbls., a daily average of 371,557 bbls., against 11,520,521 bbls., or 371,630 bbls. daily in January, 1929, according to O'Shaughnessy's Oil Reports. Shipments for the month were 10,780,673 bbls., or 347,764 bbls. per day, against 9,982,183 bbls., or 322,006 bbls. daily, in January, 1929. Details of production and shipments by companies follow:

	Barrels of 42 gallons			
	Production		Shipments	
Company—	1930	1929	1930	1929
V. O. C.	3,797,761	4,103,720	3,729,102	3,536,996
Lago	3,292,649	3,475,971	3,377,011	2,563,587
Gulf	1,942,281	2,477,975	1,914,000	2,331,000
Caribbean Pet.	1,711,200	633,733	1,216,000	748,300
Creole	479,453	638,630	354,000	630,000
Colon	111,000	.....	19,000	.....
B. C. O.	143,629	159,992	134,560	144,300
General Asphalt	40,300	30,500	37,000	28,000

Total production for Colombia, Peru, Trinidad, and Ecuador for 1929, with comparisons for the previous year, follow:

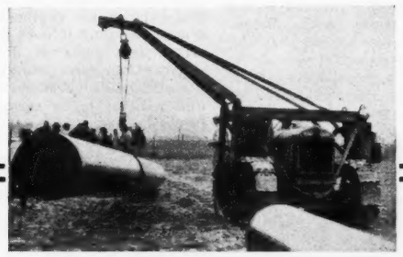
	Barrels of 42 gallons	
Company, country—	1929	1928
International Pet., Colombia	20,384,548	19,895,677
International Pet., Peru	10,821,116	9,503,720
Lobitos, Peru	2,475,353	2,357,107
Apex Trinidad, Trinidad	2,920,000	2,565,000
Trinidad Leaseholds, Trinidad	2,716,700	2,984,000
United British, Trinidad	701,112	448,962
General Asphalt, Trinidad	202,749	297,559
Kern River, Trinidad	349,419	317,992
Anglo-Ecuadorian, Ecuador	1,280,115	1,015,505
B. C. O., Ltd., Trinidad	729,851	393,086
Venezuela Consolidated, Trinidad	300,776	*85,999
Trinidad Oilfields, Trinidad	384,619	.....

*First five months 1929.

McCORMICK-DEERING INDUSTRIAL TRACTOR

—the POWER Behind a Wide Variety of Successful Winches, Pipe Handling Booms, Back Fillers, Crawlers, Welders, Spudders, Drillers, Ditchers, Graders, Etc.

[PRODUCT OF INTERNATIONAL HARVESTER]



FLEXIBILITY to combine with a great variety of oil field equipment has made the McCormick-Deering Industrial Tractor the ideal power plant for the operation of winches, booms, drillers, welding outfits, ditchers, etc. It provides abundant power at low cost.

Behind every McCormick-Deering Industrial Tractor and Power Unit stands a service policy of lasting cash value to every owner. Company-owned branches are now maintained at 180 points in the United States and Canada, supplemented by special Industrial Tractor distributors and thousands of McCormick-Deering Tractor dealers the country over.

Those interested in reducing costs in well maintenance work, pipe laying, water well drilling, private road maintenance, etc., are invited to write for the McCormick-Deering Industrial Tractor and Equipment Catalog or get in touch with the nearby distributor, who is in position to demonstrate the power and the special equipment.

The International Harvester line also includes International Motor Trucks ranging from ¾-ton to 5 tons.

INTERNATIONAL HARVESTER COMPANY
606 So. Michigan Ave. of America (Incorporated) Chicago, Illinois

McCormick-Deering Industrial Tractors—and Special Equipment —are Sold in the Oil Country by:

J. D. Adams & Co.,
217 Belmont Ave., INDIANAPOLIS, Ind.

Browning-Ferris Machinery Co.,
205 Exposition Ave., DALLAS, Tex.
1412 Ennis St., HOUSTON, Tex.

Cuyahoga Equipment Co.,
5713 Euclid Ave., CLEVELAND, Ohio

Z. T. Darrow & Son., CANANDAIGUA, N. Y.

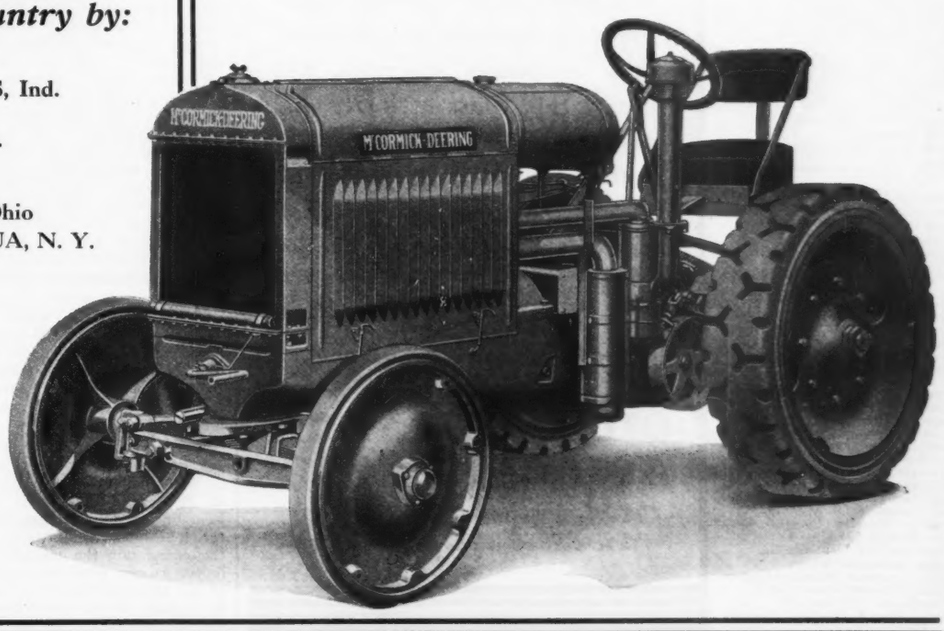
B. Hayman Co., Inc.,
118 Los Angeles St.,
LOS ANGELES, Calif.

Industrial Machinery Co.,
1621 Locust St., KANSAS CITY, Mo.

H. W. Moore Equipment Co.,
Sixth & Acoma, DENVER, Colo.

Option Equipment & Supply Co.,
Mt. Oliver Sta., PITTSBURGH, Pa.

Resistcor Engineering Corp.,
302 Okla. Natl. Bldg., TULSA, Okla.



PROTECTION

MEMBER COMPANIES:

Aetna Insurance Co.
Alliance Insurance Co.
Allied Underwriters Agency
American Insurance Co.
American Alliance Ins. Co.
American Central Ins. Co.
American Eagle Fire Ins. Co.
Automobile Ins. Co.
Ben Franklin Underwriters
Boston Insurance Co.
Caledonian Insurance Co.
California Insurance Co.
Camden Fire Ins. Association
Carolina Insurance Co.
Central States Fire Ins. Co.
Citizens Insurance Co.
City of New York Insurance Co.
Columbia Insurance Co.
Commerce Insurance Co.
Commercial Union Assurance Co.
Commercial Union Fire Ins. Co.
Commonwealth Ins. Co.
Concordia Fire Insurance Co.
Connecticut Fire Ins. Co.
Constitution Underwriters
Continental Insurance Co.
County Fire Insurance Co.
Eagle Star & British Dom. Ins. Co. Ltd.
East and West Insurance Co.
Equitable Fire & Marine Ins. Co.
Federal Union Insurance Co.
Fidelity Phenix Fire Ins. Co.
Fire & Marine Underwriters
Fireman's Fund Ins. Co.
Firemens Insurance Co.
Firemens Underwriters
Franklin Fire Insurance Co.
Girard Fire & Marine Ins. Co.
Girard Underwriters
Glens Falls Insurance Co.
Great American Ins. Co.
Hanover Fire Ins. Co.
Harmonia Fire Insurance Co.
Hartford Fire Ins. Co.
Home Fire & Marine Ins. Co.
Home Insurance Co.
Hudson Insurance Co.
Imperial Assurance Co.
Insurance Co. of North America
Insurance Co. of State of Penn.
Jersey Fire Underwriters
Lincoln Fire Insurance Co.
Liverpool & London & Globe Ins. Co.
Mechanics Insurance Co.
Mechanics Underwriters
Mercantile Insurance Co.
National Ben Franklin Fire Ins. Co.
National Fire Ins. Co.
National Liberty Ins. Co. of America
National Security Fire Ins. Co.
Newark Fire Insurance Co.
New Hampshire Fire Ins. Co.
New York Underwriters Ins. Co.
Niagara Fire Ins. Co.
North British & Mercantile Ins. Co.
Norwich Union Fire Ins. Society
Occidental Underwriters
Old Colony Ins. Co.
Palatine Insurance Co.
Patriotic Ins. Co. of America
Pennsylvania Fire Ins. Co.
Philadelphia Fire & Marine Ins. Co.
Phoenix Assurance Co.
Phoenix Insurance Co.
Providence Washington Ins. Co.
Queen Insurance Co.
Reliance Insurance Co.
Rochester Department of Great American
Royal Exchange Assurance Co.
Royal Insurance Co., Ltd.
Scotch Underwriters
Scottish Union & Nat. Ins. Co.
Security Insurance Co.
Sentinel Fire Insurance Co.
Springfield Fire & Marine Ins. Co.
St. Paul Fire & Marine Ins. Co.
Star Insurance Co. of America
Sun Insurance Office
Superior Fire Ins. Co.
Svea Fire & Life Ins. Co.
Travelers Fire Insurance Co.
Union Assurance Society
Union Insurance Society of Canton
United Firemen's Insurance Co.
Westchester Fire Ins. Co.
World Fire & Marine Insurance Co.

PROTECTS YOUR PROPERTY AND STOCKHOLDERS *against Fire Loss*

—in a basic policy of enabling oil operators to secure dependable insurance, to protect their interests, and their stockholders' * by providing expert engineering and inspection service, so that methods of insuring this Class may be standardized * and efficient fire protective devices installed and its maintenance properly supervised * thereby stabilizing the business, so that insurance companies generally, will accept this Class at lower and more equitable policy rates * with the most business-like insurance arrangement. ** Ask your agent or broker for details.

11TH YEAR

Eleventh successful year of our 100% performance record of complete dependable service rendered.

OIL INSURANCE ASSOCIATION

175 W. Jackson Blvd. Chicago

H. M. Carmichael, General Manager

SOME PROPERTIES OF TOMORROW'S GASOLINE

(Continued from Page 129)

gines had to be equipped with the various means that have been used to insure starting and to provide for satisfactory operation after the engine had been started. But, so far as the producer of gasoline is concerned this situation has changed. Today in some instances refiners are asking motor car manufacturers to modify fuel handling systems so that they will be cooler. The reason for the desire to have this done is that some of the volatile hydrocarbons produced in cracking plants and extracted from natural gas are now having to be thrown away, because with some fuel handling systems getting as hot as they do at present no more volatile material can be put into gasoline without causing trouble from vapor knock.

So, in the light of current conditions, it does not appear that the matter of making the gasoline of tomorrow volatile enough will be an especially difficult one. The quality of easy vaporization is one on which no compromise can well be accepted in the case of tomorrow's gasoline, and fortunately it appears as though a compromise in this particular will not be necessary.

Antiknock Properties

Freedom from tendency to detonate or knock in engines, the fourth essential property of an automobile fuel, is important for two well-known reasons. The first reason is that the knock is very unpleasant. The second reason is that a knocking fuel places a definite limitation upon the power and the economy of an engine. If it is to be powerful and efficient, the automobile engine must squeeze the mixture of air and gasoline close together in its cylinders, for it is only in that way that maximum expansion can be obtained, and expansion of the burned gases in its cylinders is the thing that imparts power to the piston.

The automobile driver insists that the engine of his car be powerful enough to enable him to hold a favorable position in the traffic stream. The flash of green in the semaphor has started more races already than the crack of the pistol ever will. And the streets are filled with cheaters who even get under way on the amber light. The race from traffic light to traffic light is never so long as that on the speedway, to be sure, but it is just as bitter. Each driver strives to be the pacemaker. In order to do so, he must have power. And so it is that, like Shakespeare's King Richard, many a motorist is willing to give his kingdom for a horse—or for an extra horsepower.

But the automobile driver does not demand just power alone. He insists, also, that it be pleasantly and smoothly delivered. He does not want the mechanism that generates his power to make much of a fuss about it. Satisfactory performance in a motor car is like a good digestion. If you do not notice it, then it is all right. The motorist has a habit of expressing his demand for pleasant performance and plenty of it in the most effective way possible, namely, in the preferential purchase of those cars which do perform well. And if a motor car manufacturer wants to stay in business he must heed this demand.

The elimination of knock offers the outstanding possibility of breaking the weight-power ratio, which in the past has had to remain too nearly constant. And more power with less weight would be a boon both to the motor car and to the airplane. To make a long story short, the knock must be erased from the picture.

Now it is unfortunate that we do not yet know for sure just what the disturbance called knock is nor what causes it. It is true that many theories have been proposed to explain the knock. But the truth of the matter is that neither the cause nor the mechanism of knock is yet known with certainty. And so all of the theories that have been advanced to explain knock have done nothing to reduce the importance of the continual study that is being made to get a real explanation of it.

But, although we do not know just what the knock is from a physical viewpoint, we do know what it amounts to as a barrier to the building of more powerful and more efficient engines. To the accomplishment of that desirable end the knock is the one outstanding obstacle. And, because it is an obstacle in the path of progress, it is reasonable to suppose that a way will be found to eliminate it entirely, and that some day we will have gasoline that does not knock at any compression, nor under any condition. The efficiencies that can be gotten with the gasoline engines will then be limited only by mechanical considerations and by the ceiling of what is theoretically possible.

Eliminating Knock

Four methods of making automobile fuels of improved freedom from tendency to knock have been used. These are as follows:

1. Adding to the fuel small amounts of extremely effective materials for preventing knock, such as lead tetraethyl or iron carbonyl.
2. Adding to the basic fuel a percentage of another fuel which is more nearly free from tendency to knock. Blends of benzol and gasoline and of alcohol and gasoline are the most familiar examples of automobile fuels of this second class.
3. Cracking heavy petroleum oils. Cracking in the vapor phase at temperatures higher than those ordinarily employed is now being made use of to some extent for this purpose.
4. Selecting crude oils which by nature yield gasoline of good antiknock properties.

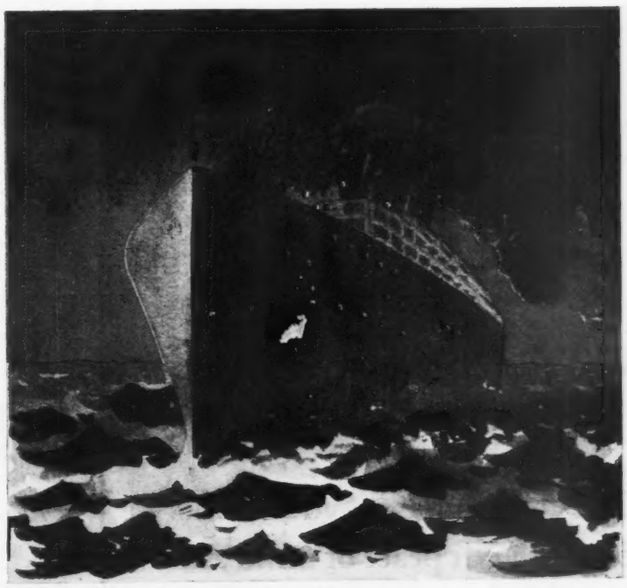
Note that all of these methods depend upon modifying the chemical constitution of the fuel. This is to be expected, for it is chemical constitution that the engine recognizes. An engine can readily tell the differences between normal heptane and benzene, for instance. On normal heptane the engine knocks violently, but on benzene it does not knock at all. Given two fuels of different chemical constitutions an ignorant truck driver can distinguish between them as quickly and with as much certainty as can the best chemist in his laboratory. Truck driving may not be conventional chemistry, but the knocking properties of fuels are such that it is quite definite in results. It matters not that the truck driver is not a chemist, for his engine is, and it is a very good chemist, too—which shows, of course, that it is not always necessary to have brains to be a chemist. The engine recognizes differences in the chemical constitution of fuels at once, and it tells the driver what he should say.

This appears to mean one thing pretty definitely. And that is that for the knock-free motor fuel of the future the chemical constitution of gasoline will have to be made what it should be, or what is known to be good from viewpoint of freedom from knock. The composition, and therefore the knocking properties, of the gasoline we have today is pretty largely a matter of chance. Our basic gasoline is got in three ways: (1) Some is distilled directly out of petroleum and taken as it comes. (2) Some is extracted from natural gas and accepted just as received. (3) Some is made by cracking or breaking down heavy oils. Only the latter of the three methods does anything at all to change the constitution of the hydrocarbons themselves into forms that are more desirable. But, fortunately, it has been possible to raise the antiknock quality of some of the gasoline sold by the addition of other materials, such as lead tetraethyl or benzol.

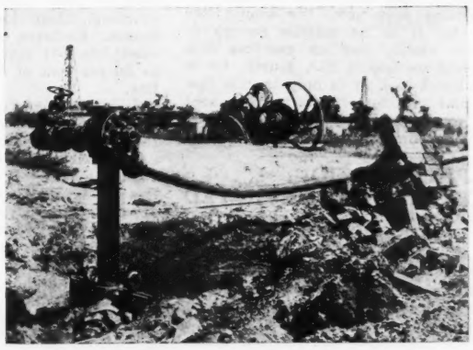
Future Standard

The quality of being knock-free is such an important one for a motor fuel to have that there is every reason to believe that the time is not far off when gasoline in general will have to meet a definite standard of antiknock quality, and that ultimately that standard will be a high one. This quality is also so important that the partial sacrifice of some of the other qualities, such as

A Drilling Well Without A CONTROL CASING HEAD

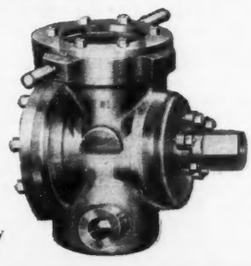


is Like a Ship Without a Rudder



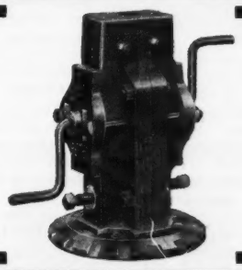
ANOTHER "CASE OF GOOD JUDGMENT"

The ravages of this fire could not penetrate the "fire wall" provided by this O.W.I. Control Casing Head. Another good producer saved.



TYPE "D" Latch Assembly Control Head

No ship-owner would risk human lives and property by operating a ship without the only device which can enable it to hold a safe course through the perils of navigation. And modern oil and gas operators refuse to endanger both lives and property by allowing any well to be drilled without the protection afforded by the O. W. I. Control Casing Head — the only device which can give the driller instant and complete mastery over any oil flow or gas pressure which may be encountered.



TYPE "D" DOUBLE ROLLER OIL SAVER With combination base which makes Oil Saver interchangeable for use in either set screw top or latch assembly Control Heads. Many other improvements give great strength, durability and efficiency.

We also manufacture Chambered Control Heads, Casing Heads, Apex Polished Rod Stuffing Boxes, and high pressure fittings for oil and gas wells and pipe lines. Write for catalog and quotations.

THE OIL WELL IMPROVEMENTS CO.
Tulsa, Okla.

GET WHAT YOU SPECIFY NOT *"Just as Good"!*

OCECO fittings on your tanks protect your peace of mind and safeguard your stockholders' interests by eliminating fire hazard* and reducing evaporation losses to a minimum.

Oceco fittings can always be delivered in less time than it takes to get a tank. Don't accept uncertain fittings claimed to be "just as good."

THE ONLY EQUIPMENT THAT IS "JUST AS GOOD" AS OCECO IS OCECO EQUIPMENT

*Recent insurance schedules recognize this by lower rates on tanks so equipped.

THE OIL CONSERVATION ENGINEERING CO.
877 Addison Road Cleveland, Ohio

Engineering and Sales Service:

25 Broadway, New York
Box 552, Beaumont, Tex.
Tulsa Trust Bldg., Tulsa, Okla.
Neilan, Schumacher & Co., Los Angeles, Cal.

cheapness as measured in price per gallon, in order to get it is amply justified. This is a thing that has necessarily been done from the outset in the case of those gasolines which have good antiknock qualities, and the continuance of it is naturally to be expetced.

Throughout this paper the assumption has been that the gasoline of the future will be a liquid volatile enough to be run in the carburetor type engine; or, in other words, in engines running on the Otto cycle, as distinguished from the Diesel cycle. This is simply an assumption on the part of the writer as there is difference of opinion about whether the gasoline of tomorrow will be a light oil or a heavy oil. But one thing, perhaps, is certain. Whether the gasoline of tomorrow is a gasoline or whether it is a heavier oil, it will have to be one that is carefully refined and of relatively narrow boiling range. It is time that there is a common conception that an injection engine can be run on almost any kind of fuel, even on crude oil. But, so far as a vehicle that must be as flexible and as foolproof as the motor car is concerned, this appears to be a misconception. The requirements of injection engines with respect to limitations on the properties of the fuel they use are fully as rigid as those of the gasoline engine.

The point to this is that, if it is going to be necessary to refine all the fuel used in the automobile engine, then it might as well be made into gasoline. And it seems likely that that is just what will be done. What has been said above has been said on this assumption.

And so, to summarize this discussion of the probable properties of tomorrow's gasoline, we should like, first, for it to be plentiful and cheap, just as gasoline is now. We should like, second, for it to have a high content of energy, just as gasoline does now. We should like third, for it to be volatile enough to vaporize easily, just as gasoline does now. And we should like, fourth, for it to be knock-free. It is only in this last particular that tomorrow's gasoline need be in any essential wise different from today's gasoline.

SULPHURIC ACID TREATMENT REVIEWED

(Continued from Page 130)

sult, although treatment with clay, filtration through a sand filter and various other schemes have been suggested.

If all of the suspended sludge is not removed prior to washing with water or soda, the impurities and resinous materials held in solution in this suspended sludge are liberated by the action of water, and are thrown back into solution in the oil.

Cracked distillates, after acid treatment, are customarily rerun in order to remove the treating residues left from the reaction of the unsaturated constituents with the acid.

Straightrun distillates after acid treatment are usually finished by sweetening or claying, without recourse to rerunning.

As has been previously indicated, the treatment of cracked petroleum distillates with sulphuric acid gives rise to the formation of treating residues which are soluble in the treated product. Important among these residues are the neutral esters of sulphuric acid and polymeric compounds.

In the case of gasoline these residues raise the distillation range of the treated product and, on evaporation of the gasoline in a porcelain dish, result in the formation of a gummy residue. Various means of removing these residues have been suggested, such as the use of clay, but no method of accomplishing this result has proven so entirely satisfactory as rerunning. In this case the residues, because of their higher boiling points, are left behind in the still, although the esters of sulphuric acid are decomposed to some extent with the liberation of sulphur dioxide.

Burning Characteristics Impaired

In the case of kerosene, these treating residues result in an impairment of the burning characteristics of the oil. They cause the formation of a hard, cokey wick crust which so clogs the wick as to impede the flow of oil and prevent the radiation of heat from the wick, resulting in the thermal destruction of the wick fiber. No method except rerunning has proven satisfactory for removing these treating residues from kerosene.

The losses incurred in the treatment of cracked petroleum distillates, especially naphthas, fall into three general classes:

(a) Loss by solution in the sulphuric acid.

(b) Loss in volatility due to the raising of the boiling range as a result of polymerization.

(c) Actual decrease in volume due to shrinkage, brought about by the condensing action of the sulphuric acid.

Some idea of the relative magnitude of these three losses can be obtained from the following data, which was obtained on the treatment of pressure still distillate with acid of the strengths indicated.

	96% H_2SO_4	92.7% H_2SO_4	79.8% H_2SO_4
Loss (a)	0.45%	0.45%	0.25%
Loss (b)	2.5 %	...	1.2 %
Loss (c)	0.83%	0.70%	1.41%
Total	3.78%	...	1.86%

Treating Losses Cut 50 Per Cent

From the above data it is seen that the use of 80 per cent acid in place of the more concentrated 96 per cent acid approximately cuts the treating losses by about 50 per cent.

Loss (b) above is difficult to evaluate and the data given were determined by noting the displacement of the distillation curve.

Gray estimates that the total loss sustained on the treatment of cracked naphtha with acid is seldom less than 5 per cent.

In the case of highly cracked gasolines, such as those produced by vapor phase cracking, these losses mount to large values. Halloran estimates that in some cases loss (b) may amount to as much as 30 per cent of the original raw gasoline.

It is obvious of course that the magnitude of these losses is dependent on the degree of unsaturation of the naphtha and the conditions of treatment.

In the case of straightrun gasolines, loss (a) is small, and losses (b) and (c) are practically negligible.

From the foregoing considerations it is obvious how variations in the conditions of treatment will alter the losses sustained and the quality of the treated product.

No general rules can be laid down which will hold for all types of light distillates. The best method for treating any distillate is a matter which will have to be settled by experiment, and will depend on the character of the distillate and the quality requirements of the finished product. Due regard, however, to the principles laid down will result in a reduction in product losses and acid consumption.

BLACK BAYOU PURCHASE

HOUSTON, Tex., Mar. 3. — The fee ownership of the Black Bayou Dome Field of Cameron Parish, Louisiana, was bought the past week by Yount Lee Oil Co. as a part of the purchase by the company of 160,000 acres in Cameron, Calcasieu, Jefferson Davis, Pides, and Vernon Parishes. The land was bought from the holdings of Mrs. Elizabeth M. Watkins and involved a cash consideration of $1,000,000. The Black Bayou Field, one of the chief acquisitions of the deal, is being developed by Shell Petroleum Corp., which has three producing wells, two from the shallow cap rock area and one from a deep sand off the side of the dome.

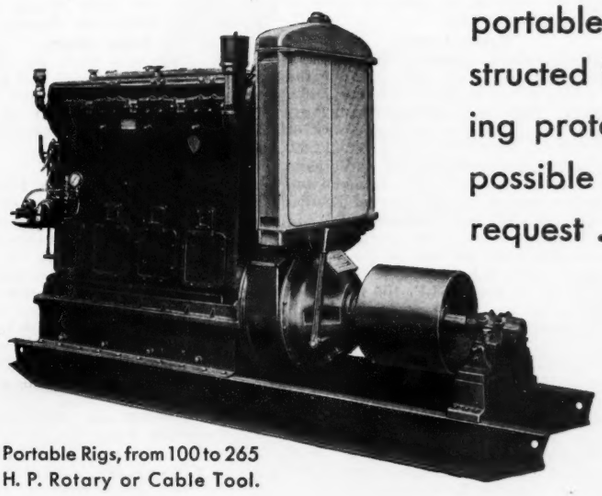
REMOVING TANKS

The Indian Territory Illuminating Oil Co. has dismantled two of its 55,000-bbl. tanks in the Little River Pool, and is moving them to the Watters farm in Section 25-11-3w, in the Oklahoma City Pool. The tanks will be erected at once on the farm to be used for lease storage.

Non-stop Power

When drilling a hole, use non-stop power, supplied by Fulton Diesels. They stick to the finish — are free from time delays caused by shut-downs for repairs, and therefore get down to oil in the shortest possible time . . . . In addition, they are a safe source of power — they limit fire hazards to the absolute minimum . . . . . .

Drive your drilling rigs with Fulton Diesels. They are portable — use very little water — are sturdily constructed from bed to head — are fully enclosed, giving protection against the elements, dust, dirt and possible damage to working parts . . . Literature on request . . . Fulton Iron Works Company, St. Louis, Missouri, U. S. A. . . . Oil Country Offices at 209 East Archer Street, Tulsa . . . and Monroe, Louisiana.



Portable Rigs, from 100 to 265 H. P. Rotary or Cable Tool.

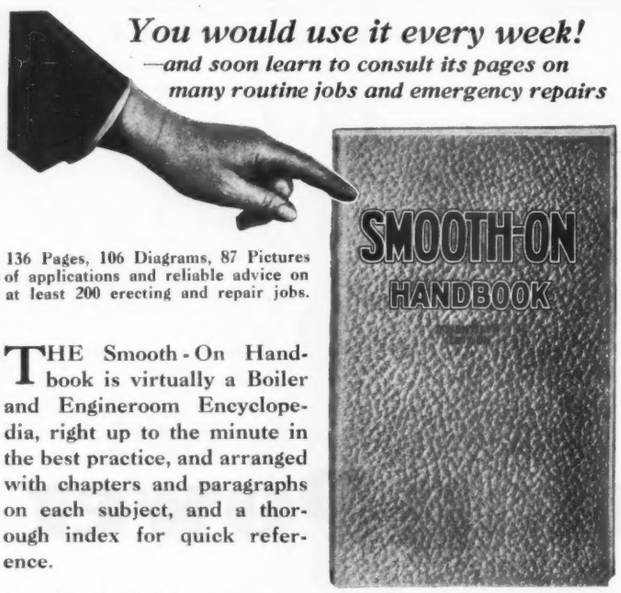
SUCCESSFUL ENGINE BUILDERS FOR OVER SEVENTY-FIVE YEARS

461

FULTON DIESELS

100 TO 2000 HORSE POWER

You would use it every week!
—and soon learn to consult its pages on many routine jobs and emergency repairs



136 Pages, 106 Diagrams, 87 Pictures of applications and reliable advice on at least 200 erecting and repair jobs.

THE Smooth-On Handbook is virtually a Boiler and Engineroom Encyclopedia, right up to the minute in the best practice, and arranged with chapters and paragraphs on each subject, and a thorough index for quick reference.

Exactly the information that every Engineer needs is given on such subjects as:

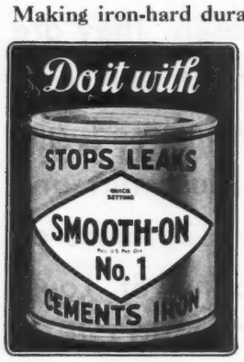
Making permanent and emergency repairs to boilers, engine cylinders, pumps, elevator cylinders, condensers, cracked pipes, feed-water heaters, economizers, steam and oil separators, storage tanks, valves, etc.

Obtaining pressure-tightness at new and old screw-threaded and flanged joints, porous spots or cracks in pressure containers.

Making emergency joints without threading, press-fit joints, unfinished cast-iron joints, caulked bell-and-spigot joints without lead, etc.

Water, oil, fire and weatherproofing walls, floors, wheel pits, sumps, storage tanks, concrete cooling ponds.

Making iron-hard durable machinery foundations, etc.



The methods outlined are based upon 30 years of world-wide experience and thousands of actual time, money and labor-saving performances under every imaginable power-plant condition.

Just what you have been looking for, and *free* if you fill in and return the coupon.

Get your Smooth-On in 1 or 5-lb. tin or 25 or 100-lb. keg from nearest supply house, or if necessary from us direct.

SMOOTH-ON MFG. CO.
Dept. 66, 570 Communipaw Ave., Jersey City, N. J.

Please send copy of the SMOOTH-ON HANDBOOK, 21st Edition.

Name _____

Address _____

_____

_____

3-6-30

SMOOTH-ON

NEW LOCATIONS IN TEXAS PANHANDLE AND NORTH AND WEST TEXAS FIELDS

TEXAS PANHANDLE
Week Ending February 19
Gray County

Danciger Refining and Champlin Refining Co.'s No. 4 Cook-Faulkner, 330 feet south and 1,146 feet west of the NE cor. of the east 120 acres of the west 210 acres of Section 30, Block B-2, H.&G.N. Same company's No. 5 Cook-Faulkner, 330 feet south and 706 feet west of the NE cor. of the east 120 acres of the west 210 acres of Section 30, Block B-2, H.&G.N. Magnolia Petroleum Co.'s No. 5 J. E. Wright, 330 feet north and 752 feet west of the SE cor. of the S half of the SW of Section 13, Block 3, I.&G.N.

Hutchinson County

Phillips Petroleum Co.'s No. 1 Johnson Brothers (Burl), 330 feet south and west of the NE cor. of the west 240 acres of the north 320 acres of Section 4, Block 1, B.&B. Same company's No. 1 Johnson Brothers (Royal), 330 feet south and east of the NW cor. of the E half of the NW of Section 34, Block Y.

Wheeler County

Murchison & Fain's No. 1-B W. L. Cooper, 280 feet north and 380 feet east of the SW cor. of the NW of Section 80, Block 23, H.&G.N.

NORTH CENTRAL AND WEST TEXAS
Week Ending February 19
Andrews County

Deep Rock Oil Co. and others' No. 1 H. Miles, 990 feet south and 1,650 feet east of the NW cor. of Section 22, Block A-46, School Land.

Archer County

C. W. Clark's No. 1 A. J. Lowe, 150 feet south and west of the NE cor. of the east 45 acres of the south 85 acres of the east 100 acres of Section 15, Crawford Subdivision, I. Holman Survey. Consolidated Oil Co.'s No. 1 H. F. Harmel, 150 feet south and 450 feet east of the NW cor. of the east 20 acres of the north 50 acres of the south 210 acres of Section 2,490, T.E.&L. E. P. Cullum and others' No. 6 Falls County School Land. 3,104 feet north and 690 feet west of the SE cor. of Section 9, Falls County School Land, A-130. Lawson-Duke and others' No. 6 W. T. Richardson, 1100 feet south and 150 feet east of the NW cor. of the south 40 acres of the west 80 acres of Section 2425, T.E.&L.

Baylor County

W. Alexander and others' No. 1 W. B. Mills, 150 feet south and east of the NW cor. of the S half of Section 2,492, T.E.&L. Barnsdall Oil Co.'s No. 2 Portwood "Left," 150 feet south and west of the NE cor. of the NW of Section 1,280, T.E.&L. Consolidated Oil Co. and others' No. 1 W. E. Martin, 1,586 feet north and 150 feet east of the SW cor. of Section 3,114, T.E.&L. Same company's No. 12 W. H. Portwood, 554 feet north and 386 feet west of the SE cor. of the SW of Section 1,281, T.E.&L. Same company's No. 1 W. H. Portwood-F, 150 feet south and east of the NW cor. of the S half of Section 1,279, T.E.&L.

Borden County

Phillips and others' No. 1 Good, 330 feet north and east of SW cor. of the SE of Section 46, Block 33, Township 4n, T.&P.

Brown County

Beasley and others' No. 1 L. Ehrke, 1,950 feet north and 200 feet west of the SE cor. of the L. Ehrke tract out of the D. Cole Survey No. 81, A-172. E. L. Smith Oil Co.'s No. 20 L. A. George, 1,002 feet north and 1,770 feet west of the SE cor. of Section 42, H.T.&B. The Texas Company's No. 7 W. S. Johnson, 1,350 feet north and 150 feet west of the SE cor. of the M. B. Nix Survey A-1,894. Ven-Mex Oil Co.'s No. 25 R. Hickman Tract A, 450 feet south and 1,650 feet east of the most westerly NW cor. of their 106.5-acre lease (Tract A) out of the Thomas Benson Survey No. 783. Young Brothers-Alexander & Woodley Petroleum Co.'s No. 25 R. Hickman, 750 feet north and 150 feet east of the SW cor. of the north 100 acres of the R. Hickman 148-acre tract out of the J. McGloin Survey No. 801, A-668. L. C. Geisendorf's No. 2 L. Wise, 2,300 feet southwest of the most westerly NE line and 715 feet northwest of the most southerly SE line of the J. M. Clark Survey No. 13, A-1,473.

Callahan County

W. F. Bateman and others' No. 1 A. Cutbirth, midway east and west and 660 feet south of the N line of the Mrs. H. L. Hunter Survey No. 527. Bradstreet & Holden's No. 3 J. L. Cavanaugh "B," 450 feet north and 850 feet east of the SW cor. of the E half of Section 98, Comal County School Land. Gibson & Johnson's No. 1 I. N. Jackson (Section 17), 150 feet north and east of the SW cor. of the SE of Section 17, E.T.R.R. Humble Oil & Refining Co.'s No. 1 I. N. Jackson-F, 750 feet north and 150 feet east of the SW cor. of the north 160 acres of Section 2, C.&M.R.R. Mook-Texas Oil Co.'s No. 4 F. Johnson, 550 feet south and 150 feet east of the NW cor. of the E half of Section 83, Comal County School Land. F. E. Shaheen and others' No. 1 D. F. Harp, 150 feet north and east of the SW cor. of the NW of the SW of Section 16, Deaf and Dumb Asylum Land. Young Brothers & Alexander's No. 1-A Hickman, 150 feet north and 450 feet east of the SW cor. of the NE of Section 148, B.B.B.&C.

Coke County

Cates & Fitzhugh's No. 1 J. R. Mims, 660 feet north and west of the SE cor. of Section 39, Block W, T.&P.

Coleman County

Amerada Petroleum Corp.'s No. 1 L. Forman, 1,200 feet south and 2,217 feet east of the NW cor. of the M. D. J. Trevino Survey No. 668, being 300 feet north and 2,217 feet east of the SW cor. of the L. Forman 343-acre tract. McCamey & Witfield's No. 3 M. T. Overall, 1,950 feet north and 1,800 feet west of the SE cor. of Section 71, Block 1, G.H.&H. Reeves & Riley's No. 1 M. F. Fude, 1,250 feet north and 150 feet east of the SW cor. of the Thomas Moffitt Survey No. 246.

Cooke County

American Refining Co. Properties' No. 1 H. D. Field and others, 450 feet north and 150 feet west of the SE cor. of the H. D. Field and others' 81-acre tract out of the J. B. McClyman Survey A-735.

Crane County

Gulf Production Co.'s No. 73 J. T. McElroy, 1,442 feet south and 4,290 feet west of the northeast corner of Gulf Production Co.'s lease out of Section 201, Block F, C.C.S.D.&R.G.N.G.R.R. Survey.

Ector County

Gulf Production Co.'s No. 1 State, 330 feet north and 440 feet west of the southeast corner of the south 160 acres of Section 1, Block 35, University Land. Gulf Production Co.'s No. 1 State-A, 330 feet south and 440 feet west of the NE cor. N half S half, Section 2, Block 35, University Land. Cosden Oil Co.'s No. 1 Kloh & Rumsey, 990 feet south and 330 feet east of the NW cor., Section 17, Block 44, Township 3s, T.&P. Survey. Cosden Oil Co.'s No. 2 University-B, 2,310 feet south and 440 feet west of the NE cor., Section 2, Block 35, University Land. Humble Oil & Refining Co. and others' No. 3 Kloh Rumsey-D, 2,325 feet north and 440 feet east of the SW cor., Section 7, Block 44, Township 3s. Same company's No. 4 Kloh & Rumsey-D, 322 feet north and 440 feet east of the SW cor., Section 7, Block 44, Township 3s, T.&P. Survey. Same company's No. 4 R. L. York, 323 feet south and 440 feet east of the NW cor., Section 16, Block 44, Township 2s, T.&P. Survey. Humble Oil & Refining Co. and others' No. 5 York, 2,334 feet south and 440 feet east of the NW cor., Section 16, Block 44, Township 3s, T.& P. Survey. Same company's No. 6 York, 2,991 feet south and 440 feet east of the NW cor., Section 16, Block 44, Township 3s, T.&P. Survey. Landreth Production Corp.'s No. 2 University-S, 330 feet

The HIGHER STANDARD

Spang [patented] Weldless Jars are standard equipment for all tools in all fields. Over 300 leading supply stores carry Spang Weldless Jars in stock.

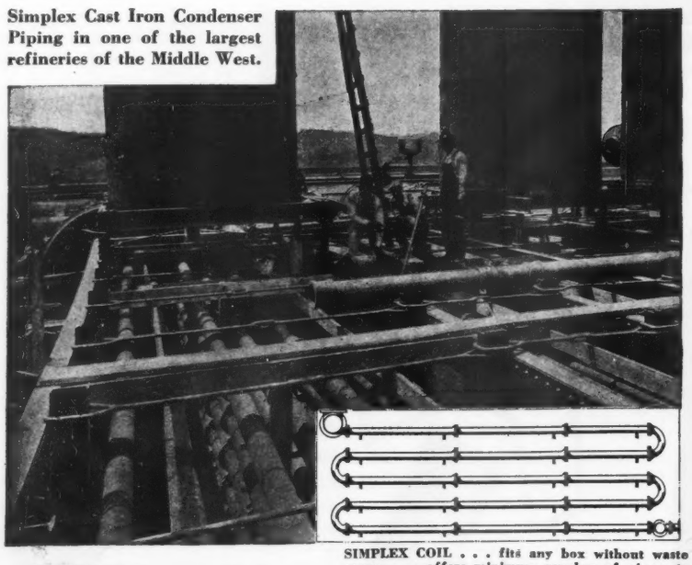
SPANG & COMPANY
BUTLER, PA.

SPANG

WELDLESS JARS

In 82 refining centers *long-lived* Simplex Piping is *used in Condenser Coils*

Simplex Cast Iron Condenser Piping in one of the largest refineries of the Middle West.



SIMPLEX COIL . . . fits any box without waste space . . . offers minimum number of pieces to handle, and minimum number of supports.

FROM Bayway, N. J., to Ocean Park, Cal. . . . from Niagara Falls, to Ingleside, Texas . . . in 82 refining centers, Simplex Cast Iron Condenser Piping is used in one or more refineries.

Such widespread popularity results from the obvious superiority of Simplex over other piping. For example, consider these advantages:

1. Simplex presents a uniform thickness of close-grained dense gray iron structure — highly resistant to the corrosive action of refinery condensates.

2. Simplex is furnished in long lengths with a maximum number of square feet of condensing area per joint.

3. Simplex requires fewer joints. Assembly is therefore more rapid, and leakage is reduced to a minimum.

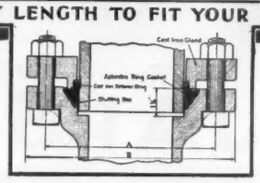
4. Simplex is easy to handle. It has no fins or other protrusions to break off. It can be rolled about without fear of damage.

Your inquiry will receive immediate attention from our engineers. Your order will be promptly, carefully shipped. Address: American Cast Iron Pipe Company, Birmingham, Alabama. Branch Offices: New York City, Chicago, Minneapolis, Cleveland, Kansas City, Dallas, Detroit, San Francisco, Los Angeles, Seattle.

SIMPLEX
CAST IRON CONDENSER PIPING

FURNISHED ANY LENGTH TO FIT YOUR BOX

WITH THE FAMOUS SIMPLEX CONDENSER »»JOINT««



OGJ-330

south and 440 feet west of the NE cor., Section 2, Block 35, University Land. Landreth Production Corp. and others' No. 1 University-R, 2,310 feet north and 440 feet west of the SE cor., Section 1, Block 35, University Land.

Eastland County

Arab Gasoline and Teatsorth and others' No. 3 V. Harbin, 900 feet south and 150 feet west of the NE cor. SE NE, Section 9, Block 4, H.&T.C. Survey. C. E. Delaney's No. 1 M. J. Harbin, 150 feet south and west of the NE cor. SE NE, Section 15, Block 2, H.&T. C. Survey. Hoffman & Page's No. 2 S. N. Coon, 150 feet north and 790 feet east of the southwest corner of the north half of the S. N. Coon tract out of Section 27, Block 2, H.&T.C. Survey. Southern Oil & Petroleum Co. and others' No. 2 C. T. Webb, 750 feet south and 480 feet east of the northwest corner of the east 80 acres of the NW, Section 26, Block 2, H.&T.C. Survey.

Foard County

Shell Petroleum Corp.'s No. 1 T. L. Ward, 150 feet north and east of the southwest corner of the north 60 acres of the T. L. Ward 119-acre tract out of Section 3, G.C.&S.F. Survey, A-117.

Glasscock County

Group No. 1 Oil and Continental Oil Co.'s No. 1 H. Phillips, 330 feet south and 990 feet east of the NW cor., Section 24, Block 33, Township 2s, T.&P. Survey. Simms Petroleum Co.'s No. 4 R. C. Coffee, 1,650 feet south and 330 feet east of the NW cor. E half, Section 22, Block 33, Township 2s, T.&P. Survey.

Howard County

American Maracaibo Co.'s No. 2 W. R. Settles-D, 330 feet north and west of the SE cor. SE SE SW, Section 135, Block 29, W.&N.W.R.R. Survey.

Jack County

C. W. Boller and others' No. 4 J. A. Raley, 1,160 feet north and 320 feet east of the southwest corner of the J. A. Raley 333-acre tract out of the I. Hughson Survey, A-256. Magnolia Petroleum Co.'s No. 1 B. F. Rankin, 150 feet north and 1,546 feet west of the southeast corner of the J. Ash Survey, A-8.

Loving County

Hadlock and others' No. 2 G. B. Russell, 1,650 feet southwest of the northeast line and 2,310 feet northwest of the southeast line of Section 80, Block 1, W.&N.W.R.R. Survey.

Menard County

Priest & Duffy's No. 1 J. P. Sorrell, 250 feet north and 550 feet west of the SE cor., Section 132, E.L.R.R. Survey.

Montague County

W. H. Godfrey and others' No. 1 J. E. Lemon, 750 feet north and east of the southwest corner of the west 70 acres of the south 100 acres of the J. E. Lemon 200-acre tract out of the S. Little Survey, A-417.

Pecos County

Gulf Production Co.'s No. 28 I. G. Yates, 4,950 feet north and 2,890 feet east of the southwest corner of the Runnels County School Land, Survey, A-2,-169, being 72 feet north and 211 feet east of the southwest corner of Proration Unit "R." Cardinal Oil Co.'s No. 1 J. H. Tippett (Pure), 150 feet north and 185 feet west of the most southerly SE cor., Section 1, D. F. Robertson Survey, A-5,187. Dixie Oil Co.'s No. 2 Mrs. F. E. Forborg, 450 feet north and 150 feet east of the SW cor. E half, Section 539, Arnold & Barrett Survey, A-3. Skelly Oil Co.'s No. 2 University Land (Bowser), 330 feet south and east of the NW cor. SE, Section 31, Block 16, University Land. Southern Crude Oil Purchasing Co.'s No. 2 J. H. Tippett-A, 150 feet south and 165 feet west of the SW cor. E half, Section 539, Arnold & Barrett Survey, A-3, and located in Section 61, Block 194, G.C.&S.F. Survey, being 150 feet south and 165 feet west of the northeast corner of its 75-acre lease "A." Same company's No. 3 J. H. Tippett-A, 150 feet south and 664 feet west of its 75-acre lease "A" out of Section 61, Block 194, G.C.&S.F. Survey.

Shackelford County

Gilman & McMurray's No. 1 E. A. Jeter, 150 feet south and east of the NW cor., Section 15, Block 11, T.&P. Survey. Roeser & Pendleton's No. 1 B. S. Walker, 150 feet northeast of the southwest line and 150 feet northwest of the southeast line of Section 533, T. E.&L. Survey.

Stephens County

Texas Consolidated Oil Co.'s No. 1 B. S. Walker, 330 feet south and east of the NW cor. SW, Section 1,304, T.E.& L. Survey.

Taylor County

Gibson & Johnson's No. 1 E. A. Bingham, 330 feet north and east of the southwest corner of the E. A. Bingham 270.8-acre tract out of Section 31, Guadalupe County School Land Survey No. 121. A. H. Gibson and others' No. 1 M. E. Cody, 888 feet north and 165 feet west of the southeast corner of Lot 2, Section 18, Guadalupe County School Land Survey, No. 120.

Ward County

J. E. Smith's No. 1 T. G. Clements, 153 feet southwest of the northeast line and 153 feet southeast of the northwest line of Lot 7, Section 7, Block 32, H.&T. C. Survey.

Wilbarger County

Atlantic Oil Producing Co.'s No. 9 W. T. Waggoner (Seigler), 510 feet north and 2,484 feet west of the SE cor., Section 50, Block 2, H.&T.C. Survey. Atlantic Oil Producing Co.'s No. 10 W. T. Waggoner (Seigler), 810 feet north and 2,784 feet west of the SE cor., Section 50, Block 2, H.&T.C. Survey. F. Baldwin and others' No. 1 H. H. Haynes, 1,320 feet north and 150 feet east of the SW cor., Section 118, Waggoner Colony Subdivision. L. G. Bradstreet Co.'s No. 1 W. T. Waggoner-K, 330 feet north and west of the SE cor. NW SW, Section 23, Block 2, H.&T.C. Survey. G. Shanor and others' No. 1 N. Hall, 200 feet south and west of the NE cor. S half SE, Section 105, Block 14, H.&T.C. Survey. Zenith Oil Co.'s No. 3 M. J. George, 233 feet south and 150 feet east of the northwest corner of the north 10 acres of the west half of the northeast 80 acres (square) of the M. J. George tract out of Section 29, J. Poitevent Survey.

Young County

H. Dyer and others' No. 2 M. Epstein, 2,396 feet north and 150 feet east of the southwest corner of the M. Epstein 311-acre tract out of the J. Conner Survey, A-57. Shaw Oil Corp.'s No. 2 J. Kisinger-A, 1,400 feet northwest of the northwest line of the W. J. Orrick Survey, A-217, and 3,450 feet southwest of the southwest line of Section 3, B.B.B.&C. Survey, A-27 and located in the John Conner Survey, A-57, being 165 feet south and west of the northeast corner of its lease "A."

ACID REFINING OF NAPHTHENE BASE OILS

(Continued from Page 184)

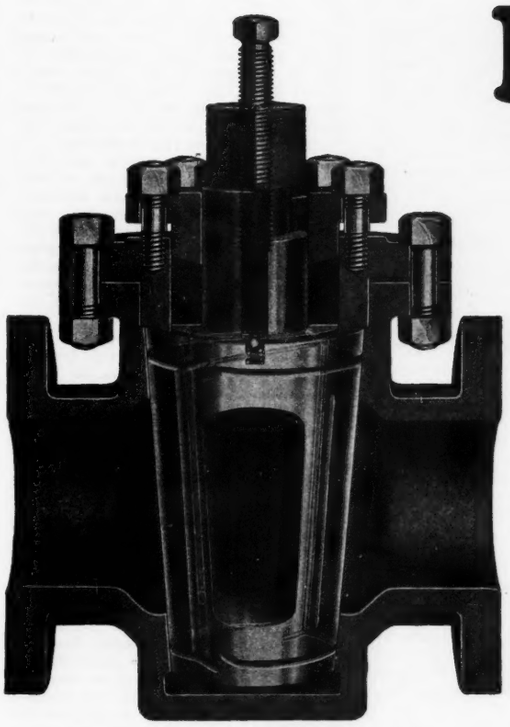
chemical properties. According to the most widely accepted view, most of the reactions which these substances undergo with sulphuric acid can be explained by polymerization. There is, however, another explanation that has been advanced by several well-known investigators, and which holds that the reaction is not an ordinary chemical reaction, but a physico-chemical one in which the colloidally dissolved particles are flocculated and absorbed by the acid. A number of arguments are advanced to substantiate this latter theory, but not enough conclusive evidence could be obtained to give the theory any great authenticity. The theory that the reaction is a chemical one is the more widely accepted one at present and there are more facts which apparently substantiate this theory. The decrease of the amount of free acid during the refining process, the evolution of sulphur dioxide, and the increase of sulphur content of oil and tar all seem to show that a chemical action has taken place.

Chemical Action

The nature of the chemical action of sulphuric acid on asphaltic and resinous substances is generally classed as polymerization. After acid treatment, the average molecular weight of the oil is higher, and there has often been secondary reactions in which the oil has taken up sulphur. Some physico-chemical

BARCO

non-sticking non-leaking Plug Valves



Cross section of LCI Barco Lubricated Valve. Also made with steam jacketed cap for asphalt and tar.

THE Barco Lubricated Plug Valve gives you dependable non-sticking and non-leaking operation, with the use of very little lubricant. The parts are machined and lapped to be tight, so that the lubricant is used only to protect the wearing parts and to make the valve easy in operation. Barco Lubricants are the finest obtainable and are furnished in types to meet all operating conditions.

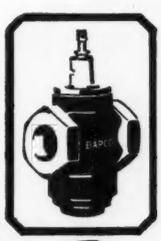
The large number of repeat orders on both Valves and Lubricant justify these statements. If you are not already using them, it will pay you to investigate.

Barco Manufacturing Co.

1801 Winnemac Avenue, Chicago, Illinois

Agents:

Vinson-Center Co., Tulsa, Oklahoma
M. N. Dannenbaum Co., Houston, Texas
The Steam Supply & Rubber Co., Seattle, Washington
Greene Brothers, Wichita Falls, Texas
Herbert Wolcott, El Paso, Texas
Petroleum Equipment Company, Los Angeles, Calif.



BARCO

Valves and Joints

O&GJ 3-6-Gray

LUMMUS

Better products --- larger yields --- closer control of specifications --- results from better fractionation. For thirty years Lummus has been developing and improving fractionating equipment and processes. This accumulated experience is built into every Lummus Petroleum Installation.

The Walter E. Lummus Co.
148 State Street, Boston
30 Church Street, New York

PETROLEUM PLANTS

reactions also take place, such as the adsorption of the lighter hydrocarbons by the acid sludge. Also a small amount of sulphuric acid is apparently dissolved in the oil and forms an unstable compound with the hydrocarbon molecules. these compounds breaking down gradually and giving the oil an acid reaction.

There are several variable factors in the refining process itself which must be taken into consideration, and controlled as much as possible, before the refiner can obtain any satisfactory results. Probably the most important factor is the amount of acid used in treating and this study has been made of the influence of varying amounts of acid on the properties of the resultant oil. The degrees of refining of the oil increases with the amount of acid used, but it is not proportional to it so that the problem is to find the point at which there is the greatest refining effect with the least amount of acid. Other factors which enter and which should be considered are the strength of the acid used, the temperature of treating, the duration of the refining operation, and the composition of the crude distillate. These three factors were kept as nearly constant as possible in these experiments. A medium lubricating distillate from a naphthene base crude was used as the base of these experiments and was treated with varying amounts of concentrated sulphuric acid (96 per cent) at a constant temperature. The duration of the refining period is the second most important variable. If the time is too short, the refining is incomplete and the sludge will not all settle out. In these experiments, agitation of the oil and acid was continued until "pepper" showed in a sample.

Removal of Tar

The removal of the tar formed by refining is always a problem, whether the treating be carried out in a five-liter percolater or a 1,000-bbl. agitator. The settling must be effected with reasonable rapidity, because if it be allowed to remain in the oil some of the newly formed compounds dissolve, and then the refining will have lost its very purpose. For this experiment, after the refining had reached a state in which the tar was suspended in the oil in small particles, called "pepper," agitation was discontinued, a few cubic centimeters of water was added to the sample, and the mixture agitated until the tar coagulated. After this addition of water, the tar "dropped" to the bottom so that the oil could be drawn off without difficulty.

It is possible, and some say feasible, to add a small amount of caustic soda directly to the acid oil, the results being the same as when water is added, but the probability of forming emulsions being so much greater that this plan was not used.

After the sludge had been removed from the oil, it was necessary to immediately remove the naphthenic acids and phenols, the sulphuric acid esters and sulphonic acids, together with small amounts of sulphuric acid which remains in the oil. For this purpose the sour oil was treated with caustic soda, which changed all the acids into salts, which were washed out with water. The alkali was added in small "dumps" for if much was added at one time the quantity of soaps formed was sufficient to cause the formation of water-in-oil emulsions. When the alkali was added in small quantities and the oil washed each time, there was less chance of forming emulsions. The alkali was added until the oil gave an alkaline reaction to be absolutely sure that the acid had all been removed. After this, washing was continued with a dilute alkaline solution until the oil was nearly neutral, after which a few final washes with pure water finished the process.

Emulsions

Emulsions may form when alkali is added to the sour mixture in spite of precautions, which may be broken either with water soluble colloids or with heat. In these experiments any emulsion formed was broken with heat as this was found to be the most satisfactory method. The temperature necessary was not very high, 150° F. being as high as any emulsion was heated. Several times, emulsions broke after continued washing without application of heat, these latter probably being only mechanical suspensions even though they appeared to be perfectly homogeneous.

Another factor which made the alkali treatment difficult was the hydrolysis of the salts of the naphthenic and sulphonic acids. These salts, which are soaps, would hydrolyze quite appreciably except in the presence of a large excess of free alkali. As it was not feasible to have this large excess present, complete neutralization of the oil was rather difficult. To minimize this hydrolysis, several washes of dilute caustic soda were used, and the soaps washed out as completely as possible with these solutions. The wash solutions used were free from salts of calcium, magnesium or iron for these if present would have formed soaps which would have been almost impossible to remove from the oil when once formed.

After the oils were treated and finished the following determinations were carefully made: Viscosity, specific gravity, color, flashpoint, internal friction, interfacial and surface tension, tar value, and carbon residue, or Conradson carbon. The following table contains the data obtained for each of these properties after treating the oil with varying amounts of acid[1].

Data of Tests

The data from these tests were plotted on co-ordinate paper against the pounds of acid used, which gives the following curves. The viscosity of a lubricating oil decreases with refining, and the viscosity curve should decrease regularly as the curve proceeds to the right until a fairly constant minimum value be reached. In this experiment, however, nothing of that sort has occurred, for it may be seen that the curve has one peak at 21 pounds of acid and another one at 50 pounds. This at first seems to indicate serious experimental error, but inspection of the "tar value" Curve No. 2, shows what may possibly be an explanation of this. Up to 17 pounds of acid, the two curves follow each other closely, indicating that a certain per cent of the colloidally dissolved tar in

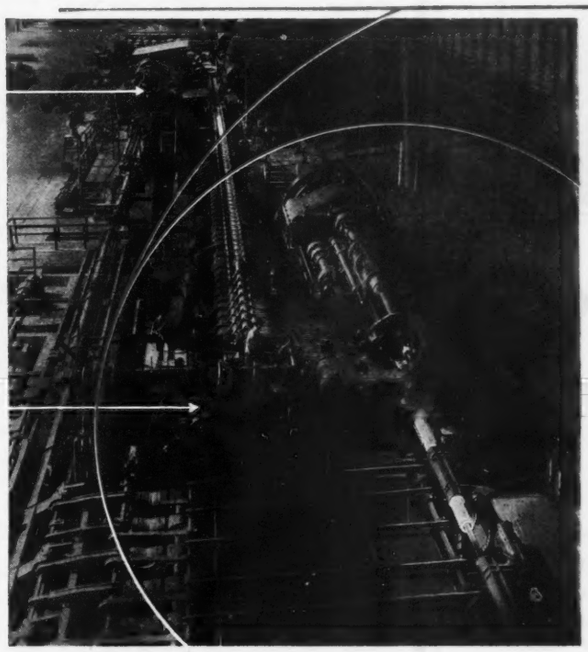
[1]Using refined olive oil as a basis for comparison gave a static coefficient of friction of .113. Also see Archbutt and Deeley, Lubrication and Lubricants. Also J.I.E.C. 14—682 8J.

DATA ON TREATED LUBRICATING OIL

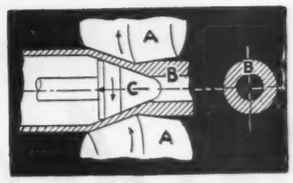
Lbs. of acid per bbl	Flash °F.	Saybolt Vis. at 100°F.	Surface tension dynes	Index of refractions	A.P.I. gravity
None	335	389.1	36.10	1.4959	23.0
1	350	352.6	34.75	1.4955	23.0
5	345	353.4	34.75	1.4951	23.0
9	350	340.4	34.65	1.4981	23.0
13	355	329.0	34.60	1.4972	23.0
17	365	332.4	34.35	1.4984	23.0
21	348	351.8	33.90	1.4990	23.6
25	340	335.9	34.00	1.4973	23.4
30	320	295.6	33.45	1.4982	23.4
50	260	342.8	33.25	1.4952	23.8

	% Tar	Color Lovibond No. Series 52	Interfacial tension, dynes	Coefficient friction	Conradson carbon
Crude	17	1,152	51	.144	.560
1	16	888	58	.156	.520
5	9.5	248	75	.158	.392
9	16	376	60	.162	.271
13	4	224	60.5	.164	.263
17	2	212	64	.166	.104
21	11	110	72	.166	.0286
25	15	126	67	.166	.034
30	14	64	64	.167	.0542
50	2	38	55	.189	.209

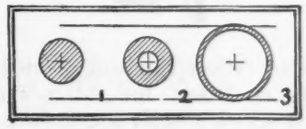
An Extra Step



Pictured are first and second piercers of the No. 2 J&L Seamless Mill at Aliquippa, Pa. All the heavy machinery circled in red is necessary to the second piercing.



Sketch showing, in cut-a-way form, the action of the second piercer in J & L Seamless Pipe manufacture. The rolls, "A" carry the tube, "B" over the second piercing, or expanding point, "C."



Development of cross-section in seamless tube manufacture: 1. Before piercing; 2. After first piercing; 3. After second piercing.

to Protect the Steel in J & L Seamless

IN producing all but the smallest sizes of seamless, J & L employs mill machinery that first pierces a small hole the length of the solid hot steel bar and then, in a second, or *extra operation,* enlarges this hole. By converting the solid bar into a tube by easy stages, J & L actually protects the steel against internal strains that, if permitted, would be detrimental to the finished seamless pipe. By this most advanced method of seamless manufacture, J & L also obtains, in the very first process, a tube of relatively uniform wall thickness.

JONES & LAUGHLIN STEEL CORPORATION

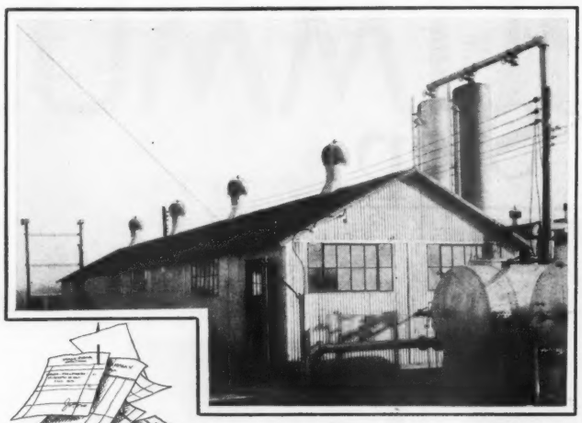
AMERICAN IRON AND STEEL WORKS

J&L STEEL

Manufacturers of Seamless and Welded Casing, Tubing, Drill Pipe and Line Pipe, and Welded Steam, Gas and Water Pipe in both Black and Galvanized.

Also makers of Bars, Shapes and Plates, Reinforcing Bars, Cold Finished Steel, Junior Beams, Steel Piling, Fabricated Structural Work, Steel Barges, Wire Products and Tin Mill Products.

JONES & LAUGHLIN BUILDING, PITTSBURGH, PENNSYLVANIA



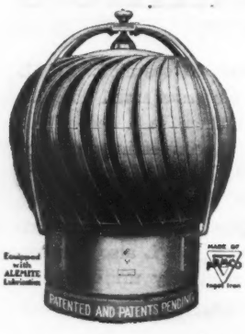
Orders for Air

Users of Allen Turbine Ventilators constantly re-order, for Allen's automatic, no-cost service, sells itself. Allen Ventilators pull the air with powerful suction, clearing the atmosphere quickly and keeping working conditions ideal.

Giving greatest air displacement, with no operating cost, is the "top efficiency" record of Allen Ventilators.

Engineering service and catalogue furnished free. State your problems to our Engineering Department.

NO OPERATING COST

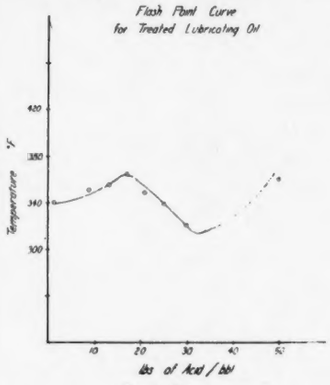


GREATEST AIR DISPLACEMENT

ALLEN AIR-TURBINE VENTILATOR CO.
1048 Fourteenth Street, Detroit

Allen Turbine Ventilator

the oil has been removed and that both tar value and viscosity are changed alike by this removal. This part of the two curves is entirely normal, and is in excellent accord with the theory. At this point, both curves begin to rise. It is very probable that enough acid has been added to the oil at this point to not only remove the most of the tar in the oil but also to produce a certain per cent of heavier oil-soluble polymers which it cannot remove. That this is a feasible explanation is borne out by the fact that when the acid is increased, the curves again take a downward slope, indicating that enough acid is now present to remove the original tar, to polymerize other products and also to remove these products of polymerization. At the very end of the curves, the tar value is at a minimum while the viscosity increases again. It is possible that the oil



Curve No. 9.

has reached that condition which is commonly called "burned." This is possible only if there have been produced substances in the oil that will increase the viscosity, but will not give a higher tar value. Just what these pounds are it is impossible to say at this time.

Conradson Carbon Curve

The Conradson carbon curve, which indicates the carbon residue of the lubricating oil, decreases regularly to a minimum point and then rises slightly at the highest acid treat. This follows the normal trend of such curves, the carbon in the oil being removed by oxidation, etc., until the last point where a certain amount of polymerization of lighter products seem to have taken place to increase the heavier hydrocarbons in the oil, or formation of sulphones has become appreciable, most probably the latter.

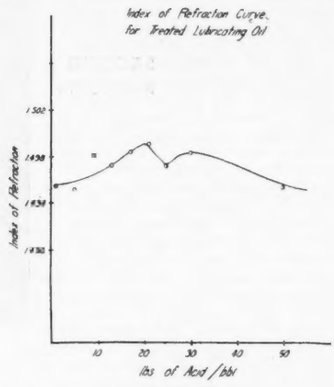
The color curve shows that the color decreases normally with increased treats of acid. It is interesting to note, however, that during the acid treat the oil is uniformly a deep blue color, and does not turn lighter until the caustic soda treatment has been made. This is due to the fact that the tar dispersed in the oil gave this color, and only after its removal was the true color of the oil apparent.

Interfacial and surface tensions play an important part in the treating and use of lubricating oils because of their influence upon the tendency of the oil to emulsify and because of their influence upon the lubricating qualities of the oil. The interfacial tension determines the ability of the oil to penetrate between two surfaces and produce a lubricating film which will protect the metal. The emulsifying tendency is important only during treatment, the lower the surface tension and the higher the interfacial tension the more liable the oil to form emulsions. From these two curves it is also possible to tell something of the composition of the oil, for the surface tension increases as the different series of hydrocarbons in the oil varies. The paraffin series has the lowest surface tension, and increase progressively through the naphthenes, the aromatics, and the unsaturated hydrocarbons, while the interfacial tension is decreased as the oil varies through this same series[6]. The surface tension curve obtained in this experiment would thus indicate that as the acid treatment is increased more and more of all constituents except the paraffin series has been removed from the oil, and this is exactly what would be expected. The interfacial tension curve, however, presents many abnormalities. Further investigation is necessary on this property.

A.P.I. Gravity Curve

The A.P.I. gravity curve of the lubricating oil calls for very little comment, since the A.P.I. gravity of the oil increased with refining as would be expected. Light treats with acid had a negligible effect upon the A.P.I. gravity, while the heavier treats caused an increase in A.P.I. gravity, with a corresponding decrease in specific gravity. This slight increase with higher treats of acid seems to indicate that unsaturated hydrocarbons and asphaltic substances are progressively removed and bring about this change, the final leveling off of this curve bearing out the theory.

The curve obtained for static coefficient of friction shows in a[7] distinct manner the degree of refining of the oil. The reason for this being that the wetting power of pure saturated hydrocarbons is



Curve No. 10.

low, and the wetting power of unsaturated compounds and of various polar compounds which exist in the oil is high. Thus the coefficient friction of the oil continues to rise as the unsaturated hydrocarbons, oxygen-bearing compounds, and other impurities which are harmful to lubricating qualities are removed, as the film on the surfaces becomes thinner and more unstable[5-7].

From an examination of the curves obtained in this experiment, it seems that for the oil used, which was a medium viscosity asphaltic base lub distillate treats of from 17 to 21 pounds of acid per barrel of oil will produce the best lubricant. The viscosity of the oil treated with this amount of acid is satisfactory, the carbon residue low, and the tar value fairly low. The tendency toward emulsification, as shown by surface and interfacial tension curves, is not excessive, and the coefficient of friction is as low as could be obtained with any refining. These two treats, and especially the 21-pound treat, show the best properties taken collectively.

The results of these experiments are not final, and suggest several problems for further investigations, which are in progress.

[6]For interfacial tensions see the work of Langmuir, Hawkins, and others. Also J.I.E.C. 14—626, J.I.E.C. 14—682 J.F.

DEATH OF M. C. FRENCH

M. C. French, well known oil producer in Oklahoma and formerly prominent in the development of fields in Kentucky, died at Okmulgee after a brief illness. Prior to coming to the oil country Mr. French was engaged in mining operations in Wisconsin, Minnesota and Canada. He was for a time a partner of Waite Phillips in operations in the Okmulgee Field.

Fast easy cuts

When your crews want to cut a pipe or a sheet or an angle-iron, they want to cut it fast.

Give them Starrett Hacksaws and Starrett Hacksaw Blades. Frames are rigid, quickly adjusted. They have the right hang. Blades cut fast, and they keep on cutting fast long after ordinary blades are worn out.

Ask for the Starrett Catalog No. 24OG. It describes and illustrates the complete line of Starrett Hacksaws and over 2500 other Starrett Tools.

Starrett Hacksaw Blades No. 252

Starrett Hacksaw Frame No. 169

THE L. S. STARRETT CO.
World's Greatest Toolmakers
Manufacturers of Hacksaws Unexcelled
Steel Tapes—Standard for Accuracy
ATHOL, MASS., U. S. A.

Golden Anniversary of Starrett Tools 1880-1930

Use Starrett Hacksaws

3587

MICHIGAN FIELDS

(Continued from Page 78)

SE SW, Section 22-10-16, would be plugged and abandoned in the upper Traverse. It failed to make commercial production at 1,725 feet.

Two Kooi wells of the Citizens and Lake Shore Petroleum companies in the section will be deepened to the lower Traverse or Dundee. The Lake Shore Petroleum Co. is to deepen No. 1 De Vries, SW NE, Section 8-10-16.

Production of the Reed Oil Co.'s No. 2 E. F. Plunkett, SE SE, Section 8-10-16, on the river flats, has increased from 25 bbls. to more than 300 bbls. a day, about the largest well in the field today.

Oceana County

After a show of oil and gas in the lower Traverse, Edward Duvall was about ready to drill into the Dundee on No. 1 Schultz, NW NW, Section 12-15n-18w, Golden Township, Oceana County. It was reported about 1,975 feet deep and at the top of the Dundee limestone.

Allegan County

A show of oil was struck in the lower Traverse at 1,870 feet in an Allegan County wildcat but the well is being carried on to the Dundee. The well is the National Petroleum Corp.'s No. 1 Oliver W. Gere, NW NW, Section 13-3n-12w, Hopkins Township.

Permit was issued for Norris and Smith's No. 1 Kruzen, SW NW, Section 28-2n-5w, Carmel Township, Eaton County.

State Auction of Leases

Michigan's second auction of oil and gas leases on state land was held Thursday, February 27. The State realized $13,740 for the rights on about 26,000 acres of the 37,000 acres offered. The State also will receive 50 cents an acre for all leases on which drilling is not started within a year. Brisk competitive bidding between the Pure Oil Co., Dixie Oil Co., Sun Oil Co., Shell Petroleum Corp. and other large companies for 12,000 acres in Ogemaw County was the principal cause of the higher prices paid.

It is reported the Pure Oil Co. recently obtained a large acreage in Ogemaw County and is planning a systematic drilling campaign. About 25 per cent of the state acreage in this territory was withheld for future sale if oil is discovered. The acreage withheld is checkerboarded.

No bids were made for the rights on 240 acres in Midland County and 40 acres in Isabella County. It is believed the new state provision for a sliding scale of royalties on producing wells in proven territory frightened the bidders. These tracts were termed proven acreage and thus would have been subject to the sliding scale of one-eighth to 100 bbls., one-sixth of the second 100 bbls., one-fifth of the third 100 bbls. and one-fourth or 25 per cent for all over 300 bbls. average daily production.

Forty acres in Newaygo County and 160 acres in Manistee County went for nominal sums and about half of the large tract of 24,000 acres offered in Arenac County was not bid in. The highest price was $85 an acre for one 40-acre tract in Ogemaw County. Another forty brought $75 an acre and $70 an acre was paid for a tract including 127 acres. The average for Ogemaw County acreage was $1 an acre.

Deep Test for Mount Pleasant

The Pure Oil Co. is preparing to drill the first deep test below the Dundee in the proven Mount Pleasant Field. The Glen M. Reem lease in the SE Section 12-14n-3w, Chippewa Township, Isabella County, will be the site of the deep test which will be at least 1,400 feet deeper than the present Dundee sands in the field struck between 3,500 and 3,600 feet.

A wildcat test of Section 24, Chippewa Township, south of the proven field, also is a possibility in the northeast corner of the Davidson lease which includes the entire section of 640 acres.

The Atlantic Exploration Co.'s No. 1 Brydges, NW SW, Section 12-11n-13w, Ashland Township, near Grant, is the only drilling wildcat in Newaygo County. It has reached 3,775 feet.

UNDERWRITERS *of* NATURAL GAS SECURITIES

Inquiries Invited

ZWETSCH, HEINZELMANN & CO. Inc.

57 William Street New York, N.Y.

Better Every Week

Every week, while the current issue of The Oil and Gas Journal is being mailed, the entire staff joins in a meeting to review it, and to discuss ways and means to give you a still better Oil and Gas Journal next week.

You are kept in mind constantly. The Oil and Gas Journal realizes the importance of its mission to serve you faithfully and well. It spares neither time, money nor effort in its desire to give you definite information that you can use to good advantage every week of the year.

Read it every week and always renew your subscription promptly.

The OIL and GAS JOURNAL
PRODUCING REFINING MARKETING
TULSA, OKLAHOMA

102½ TONS

Pressure Resistance

in THE LAYNE MILLED GROOVE SCREEN

This remarkable and sensational tensile strength of *Layne Milled Groove Screen* was proven in recent severe tests by the Pittsburgh Testing Laboratory, using a 600,000-pound capacity Universal Testing machine and pulled to failure, which was at 307,600 pounds or more than 153 tons—the actual pressure resisting, before failure, was 102½ tons.

The average wall thickness of the screen pipe was .382 inches, and the average O.D. was 5.005 inches.

You can't go wrong with *Milled Groove!* It is your definite guarantee for great strength, long life, utmost economy, and increased production from 33-1/3% to 100%. Large companies abroad and in this country will testify to this fact.

Install *Layne Milled Groove* instead of wishing you had.

Write, wire or phone for further information, catalogue or quick service.

The Layne & Bowler Co.

Houston THE LAYNE Texas

Increases Production

The Layne New York Co. 30 Church St., New York

The Layne & Bowler Corp. Los Angeles, Cal.

Vickers, Limited London, England

SIMPLE ANALYSIS OF HEAT INTERCHANGE

(Continued from Page 180)

words, the area under the curve is proportional to the interchanger surface. For many problems the mere reduction of the estimated or planimetered value of this area to terms of interchanger surface is all that is required. In other cases it is desirable to know the relationship between temperature and interchanger surface as given in Figure No. 6. In the latter case, the control temperature of the specific surface curve is divided into relatively small increments (25° F. in the problem under discussion) and the areas separately calculated for each particular increment. The surfaces resulting from this calculation are tabulated in their respective sections on Figure No. 5.

The calculated surface increments of Figure No. 5 are then laid off in succession on the surface scale of the temperature-surface diagram (6) and the corresponding temperatures of gas oil and asphalt plotted against them. Drawing a smooth curve through the resultant points gives the ordinary temperature-surface curves of the literature.

To recapitulate, the using of average values for an overall heat transfer coefficient and log mean temperature difference factor, as developed in the elementary analytical treatment of the interchanger problem, is liable to lead to large errors when dealing with operations involving large variations in the instantaneous values of the specific heats and heat transfer coefficients. On the other hand, the resorting to a graphical analysis of the problem makes it possible to use these instantaneous values of the specific heats, heat transfer coefficients, and temperature differences for its solution. These instantaneous values can be calculated with a reasonable degree of accuracy. When the heat transfer coefficients or specific heats vary widely during the course of the heat interchange operation, such instantaneous values are still valid, and their use still produces a reasonably correct solution of the problem.

TABLE No. 3
CALCULATION OF SPECIFIC SURFACE VALUES FOR FIGURE No. 5

Asphaltic Temperature, °F.—	400°	365°	325°	285°	250°
Heat transf. coef. "K"—Table 2	89.0	77.5	43.3	22.5	16.3
Specific heat, C, of asphalt	0.565	0.550	0.525	0.503	0.490
B.t.u.'s given up by asphalt per 1° F. loss	40,400	39,300	37,500	36,000	35,000
Equivalent gas oil temps.—Figure 3	350	303	250	197	150
Temp. diff. "O," asphalt-G.O. temps.	50	62	75	88	100
K × Θ	4,450	4,810	3,260	1,980	1,630
Specific surface=Q/KΘ	9.08	8.18	11.50	18.15	21.40

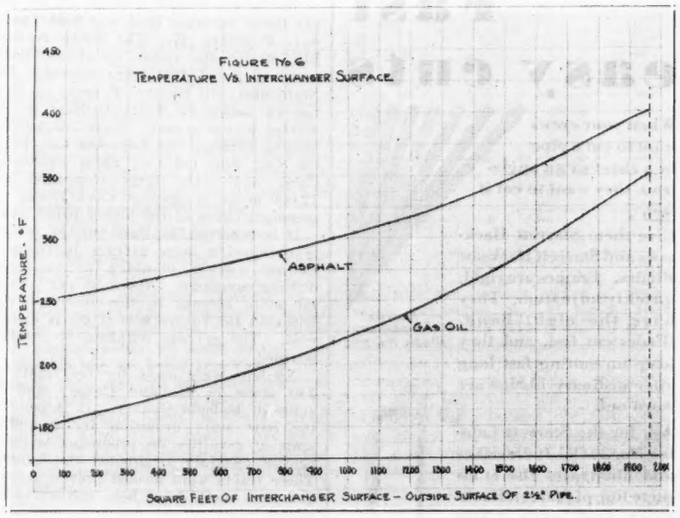


FIGURE No 6
TEMPERATURE VS. INTERCHANGER SURFACE.
ASPHALT
GAS OIL
TEMPERATURE - °F
SQUARE FEET OF INTERCHANGER SURFACE - OUTSIDE SURFACE OF 2½" PIPE.

SOLVING GUM PROBLEM IN PLANT OPERATION

(Continued from Page 186)

greater percentage of gum than untreated gasoline unless the strength of the hypochlorite has been carefully controlled. Gasolines may be treated in the liquid phase with absorptive materials such as fuller's earth and silica-gel, and the color will usually be improved, but this treatment apparently often starts a polymerizing reaction, and after standing the percentage of gum may increase. In gasolines made from acid-treated pressure distillates gums quite often settle out and the color becomes unstable. This may be attributed to esters formed as a result of the acid treatment and dissolved in the gasoline. It has been observed by the authors that the formation of gums and color instability can be appreciably reduced if, when rerunning acid-treated pressure distillate, the gasoline vapors as they come from the still are washed with water. Probably the esters are dissolved by the water and thus removed from the gasoline. The use of water produces results in this respect as beneficial as a steam distillation. The use of a caustic wash also reduces the formation of gums.

THERMODYNAMICS IN CRACKING EXPLAINED

(Continued from Page 183)

ron equation which states that the rate of change of vapor pressure with temperature

$$\frac{dP}{dT}$$

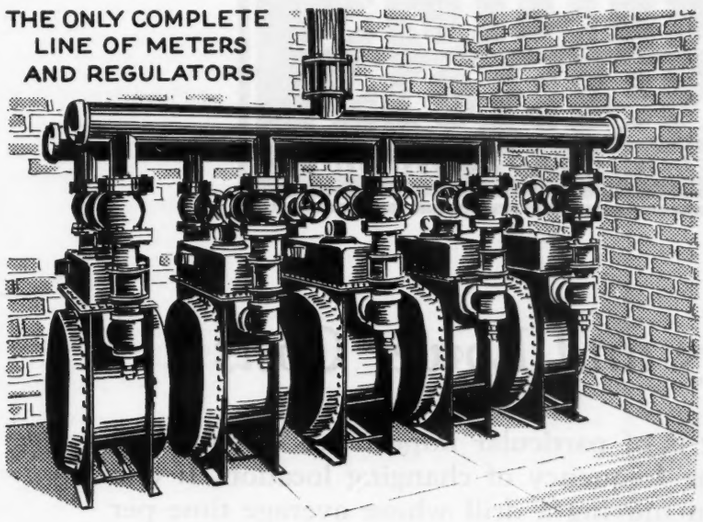
is equal to the latent heat of vaporization (L_v) divided by the product of temperature and the difference between the molal volume of the solid and that of the gas. The volume of the solid can be neglected, giving

$$\frac{dP}{dT} = \frac{L_v}{TV_g} \qquad (41)$$

On dividing equation 41 by P and substituting for PV_g its equivalent RT, the following equation is obtained:

$$\frac{1}{P}\frac{dP}{dT} = \frac{L_v}{RT^2} \qquad (42)$$

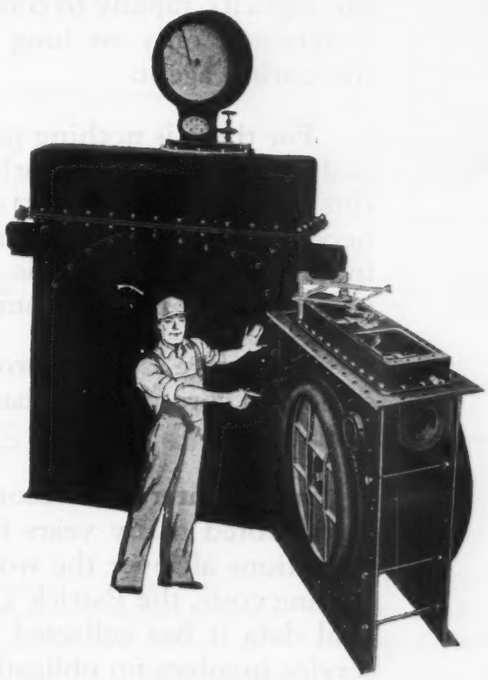
Equation 42 is an exceptionally useful one, since it enables the external latent heat of vaporization (L_v) to be calcu-



FOR INDUSTRIAL INSTALLATIONS -EMCO 5's

Requiring slightly over four square feet of floor space and just over three feet in height, the compactness of this meter is greatly appreciated for manifold installations. The entire assembly weighs approximately 900 pounds.

The pressed steel case construction; Rolling type diaphragms, mounted on terne iron pans reinforced to maintain absolute rigidity; Diaphragm drains; Patented tangent adjustment; Flag rod and movement so mounted to eliminate friction; Exclusive valve arrangement; Interchangeability of all parts; Moving parts cadmium plated; these features combine to produce a meter that will measure accurately 10,000 cu. ft. of gas per hour with a pressure drop of less than two inches of water.



EMCO PRINCIPLES

Rolling Type Diaphragm - All Parts Interchangeable
Steel Case - Rugged Beyond Compare
Easily Repaired - In The Line

EMCO METERS AND REGULATORS

PITTSBURGH EQUITABLE METER COMPANY

Main Office and Works—Pittsburgh, Pa.

New York City, Chicago, Ill., Tulsa, Okla., Dallas, Texas, Columbia, S. C., Salt Lake City, Seattle, Wash., Houston, Texas, Los Angeles, Calif., Kansas City, Mo.

PATRICK
CARBON
for Diamond Core Drilling

Portability and Lower Costs

TIME saved in moving is of particular importance in structural core drilling due to the frequency of changing location. If one half day can be saved in moving a drill whose average time per location is a week, a saving of 26 days a year is effected.

So Portability is important and is one of the valuable characteristics of the Diamond Core Drill. Extreme portability coupled with the capacity rapidly to core any formation regardless of its hardness is retained only so long as bits set with Carbon are used as the coring agent.

For there is nothing possessing the hardness, resistance to wear, and cutting ability of Carbon. By means of these qualities, Carbon cuts with minimum effort on the part of the drill, eliminating the necessity for heavier equipment, which not only costs more in initial investment, but which is more expensive to maintain and operate and less easily moved from place to place.

Therefore Carbon provides an actual dollar-saving economy in structural core drilling that more than compensates for its greater initial cost.

In the interest of economic drilling, the Patrick Organization has devoted many years in research and study to actual drilling operations all over the world. To drillers and others interested in drilling costs, the Patrick Organization will gladly present the practical data it has collected on the factors of drilling expense. This service involves no obligation whatever, and is colored by only one prejudice—insistence upon minimum cost-per-foot, all costs considered.

Send today for Patrick literature: "How to Cut Carbon Costs" and "Diamond Core Drilling in Oil Field Practice." Either or both of these authoritative booklets will be sent free upon request.

R. S. PATRICK
Duluth, Minnesota, U.S.A.
Cable Address, Exploring" Duluth

lated from the vapor pressure (P) and the slope

$$\frac{dP}{dT}$$

of the temperature vapor pressure curve.

Importance of Third Law of Thermodynamics in Gaseous Reactions

For the sake of convenience in reference the general free energy equation 24 will be given again here. It reads:

$$\Delta F = \Delta H - T\Delta S \qquad (43)$$

The calculation of the free energy change of a reaction (ΔF) requires a knowledge of the reaction heat (ΔH) and of the entropy change of the reaction (ΔS). The temperature T is naturally known.

Experimental determination of the reaction heat (ΔH) at room temperature is easily possible by calorimetric methods, or it may be computed from the experimentally determined heats of formation.

Conversion of reaction heat at room temperature up to the desired reaction heat at a higher temperature is a relatively simple matter which can be accomplished with considerable accuracy, requiring as it does only a knowledge of the molal specific heats of the initial and resulting substances over the range from temperature up to the temperature at which the reaction actually occurs. This temperature range is one in which no great difficulty is encountered in the experimental determination of specific heat values. The difference between the reaction heat at room temperature and the temperature in question depends only on the difference between the summated molal specific heats of initial and resulting substances, and not upon their absolute value.

On the contrary, in the case of the entropy change of the reaction (ΔS) there is no direct experimental method for its measurement at room temperature, as is the case with the reaction heat. Furthermore, as can be observed from equations 28 and 29, the calculation of the entropy of a substance requires that its molal specific heat in solid form at the absolute zero be known. Similarly, the calculation of the entropy change of a reaction, which is equal to the summated entropies of the initial substance minus those of the resultants requires that the molal specific heats of both initial and resulting substances in the solid state at absolute zero be known.

Now the third law states that the entropy of any solid crystalline substances is equal to zero at the absolute zero. It is for this reason that the third law of thermodynamics alone makes possible the calculation of the entropy change, and hence the free energy change, from purely thermal data. In absence of the application of the third law, the calculation of the entropy change and of the free energy change requires at least one experimental measurement of equilibrium in addition to the purely thermal data, that is, reaction heat and specific heats and latent heat of vaporization (or fusion if involved).

Method for Calculation of Ordinary Equilibrium Constant of a Reaction from Its Free Energy Change (ΔF)

In the case of a reaction of the generalized type

$$Aa + bB \ldots = rR + qQ \ldots$$

in which a mols of the substances A reacts with b mols of the substances B, etc., to yield r mols of the substances R and q mols of the substance Q, the ordinary equilibrium constant K is defined by equation

$$K = \frac{p^r R \cdot p^q Q}{p^a A \cdot p^b B} \qquad (44)$$

where pA, pB, pQ, etc., represent the partial pressures at equilibrium in atmospheres, and the indices r, q, a, b, etc., the powers to which these pressures are raised. Thus, if there are 2 mols of substance A involved in the reaction, the partial pressure, pA, of this substance would appear in Equation 44 as the square of pA or as pA^2. When only 1 mol is involved, the pressure appears as the first power, or simply as the pressure itself.

As has been already stated, the free energy change of a reaction is equivalent to the maximum mechanical work obtained when the system which the reaction comprises moves from its standard state to its final or equilibrium state at constant pressure. In this standard state the partial pressure of each gaseous substance involved in the reaction is taken as equal to unity, i.e., to 1 atmosphere. The problem then resolves itself into determining the maximum mechanical work which each of the gaseous substances would do in moving from a pressure of 1 atmosphere to its equilibrium pressure and then getting the total of each such work therm, due account being taken of algebraic sign.

The maximum work of which a gaseous substance is capable in isothermal change from one pressure to another is deducible from the gas law. In the case of a drop in pressure, the work, W, expressed in calories is given by the equation

$$W = 2.303\ RT \log \frac{P}{p} \qquad (45)$$

where P is the initial pressure and p the final pressure. In the case of an increase in pressure,

$$W = 2.303\ RT \frac{P}{p}$$

In the particular case of the present problem P is equal to unity for each of the substances involved in the reaction. In the case of the initial substances taking part in the reaction,

$$W_i = 2.303\ RT \log \frac{1}{p^a A \cdot p^b B}$$

and for the resulting substances

$$W_r = 2.303\ RT \log \frac{p^r R \cdot p^q Q}{1}$$

Therefore, the total work, which is equal to the sum of W_i and W_r, is given by the equation

$$W = 2.303\ RT \log \frac{p^r R \cdot p^q Q}{p^a A \cdot p^b B}$$

$$= 2.303\ RT \log K \qquad (46)$$

According to the first law, however, the work done is equal to the change in the free energy of the system. Therefore,

$$\Delta F = 2.303\ RT \log K \qquad (47)$$

Equation 47 may also be written in the form

$$\log K = \frac{\Delta F}{2.303\ RT} \qquad (48)$$

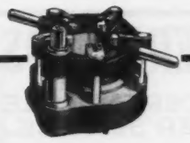
or, since R = 1.9885, in the simpler form

$$\log K = \frac{\Delta F}{4.58\ T} \qquad (49)$$

It is to be noted that Equation 44 which defines the equilibrium constant K in terms of the partial pressures of initial and resulting substances seems to ignore the possibility that solids may be present. Nevertheless, this equation holds as well for reaction involving gases and solids as it does for those in which gases only are involved, provided the solids present are pure, i.e., do not contain in solid solution any substances which can take part in the reaction. The reason for this resides in the fact that the concentration of all solids of the pure, crystalline type is constant and equal to unity; hence the inclusion of such concentrations does not show up in Equation 44 and is unnecessary.

Calculation of Equilibrium in Decomposition of Methane

As an illustrative example of the application of the preceding equations and laws, consider the decomposition of me-

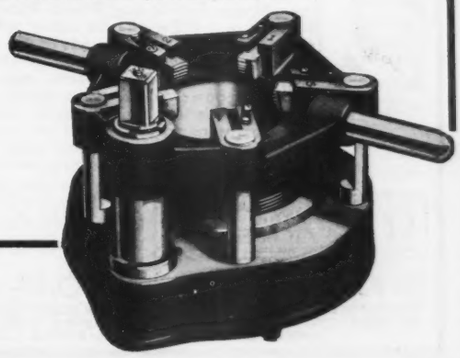


THREAD LARGE PIPE ANYWHERE

Let "TOLEDO'S" handle your large pipe. So easy to operate that one man can thread 12" pipe. Can be easily moved about and will give years of service as thousands of "TOLEDO" users will testify.

If you are not familiar with the easy "TOLEDO" way to cut and thread pipe, drop us a post card for complete information.

THE TOLEDO PIPE THREADING MACHINE CO.
TOLEDO, OHIO
New York Office: 72 Lafayette St.



FRANCIS, BRO. & CO.

ESTABLISHED 1877

Stocks—Bonds—Cotton—Grain

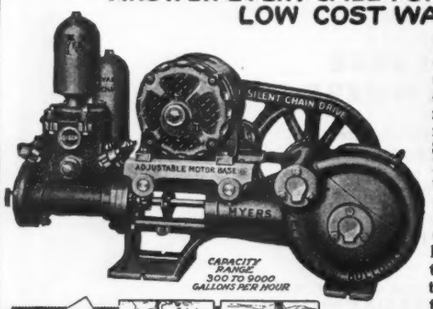
MEMBERS

New York Stock Exchange
New York Cotton Exchange
St. Louis Stock Exchange
New York Curb "Associate"
Chicago Board of Trade
Chicago Stock Exchange
St. Louis Merchants' Exchange
New York Coffee and Sugar Exchange

4th & Olive Str. St. Louis
Kennedy Bldg. Tulsa

MYERS SELF-OILING POWER PUMPS

ANSWER EVERY CALL FOR DEPENDABLE LOW COST WATER SERVICE

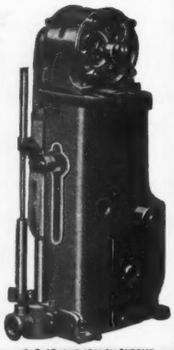


Every operator in the oil or gas industry at some time or other becomes a purchaser of new pumping equipment. While Myers Self-Oiling Power Pumps are not adapted to every requirement in this particular field, where the volume of water to be pumped hourly does not exceed ten thousand gallons there is a style and size that will fit into your operating equipment perfectly and place your water problems on a highly economical basis.

Search the entire field for pumping advantages that will compare with those of Myers Self-Oiling Power Pumps. They are not to be found. Then why not get the facts before you purchase? Yes—Myers Self-Oiling Power Pumps do make quite a difference in water service. If you doubt this, ask any one of the thousands of satisfied users. Positive self-lubrication, housed working parts, improved method of power application, extra large valves, higher speed, increased volume, lower maintenance costs—all are responsible for the splendid record they have established for themselves everywhere.

Take Off Your Hat To The MYERS
PUMPS · WATER SYSTEMS · HAY TOOLS · DOOR HANGERS

There is a jobber or supply house nearby who will be glad to supply you with Myers Self-Oiling Power Pumps. If you prefer, write us direct.



THE F.E.MYERS & BRO. CO. ASHLAND, OHIO.

Manufacturers for over Fifty Years of MYERS "HONOR-BILT" PUMPS for Every Purpose.
WATER SYSTEMS · HAY and GRAIN UNLOADING TOOLS · BARN, FACTORY and GARAGE DOOR HANGERS · STORE LADDERS, Etc.

PETROLEUM

AND

TRADING

CORPORATION

CLASS A STOCK

BOUGHT—SOLD—QUOTED

CARL H. PFORZHEIMER & CO.

(Specialists in Standard Oil and Miscellaneous Oil Securities)

25 Broad Street New York, N. Y.

thane at 823° K.[1] (550° C.). The reaction in question is the following:

$$CH_4 = C + 2H_2$$

Specific Heat Difference (ΔC_p)—Lewis and Randall give the following algebraic equation for the molal specific heats of methane, carbon (graphite), and hydrogen:

Methane: $C_p = 7.5 + 0.005T$

Carbon: $C_p = 1.1 + 0.0048T - 0.0000012T^2$

Hydrogen: $C_p = 6.50 + 0.0009T$

The value for methane is stated by the writers to be a rough estimate.

Since 2 mols of hydrogen are involved in the reaction the third equation must be multiplied by 2, giving $13.0 + 0.0018T$. Upon adding this to the carbon equation, the molal specific heat of the resulting substances is found to be equal to $14.1 + 0.0066T - 0.0000012T^2$. Hence, ΔC_p, the molal specific heat of the initial substances (a single substance, methane, in this example) minus that of the resulting substances may be expressed as,

$$\Delta C_p = -6.6 - 0.0016T + 0.0000012T^2 \quad (50)$$

Rate of Change of Reaction Heat with Temperature: From Equation 30,

$$\frac{d(\Delta H)}{dT} = \Delta C_p$$

and hence in the present case

$$\frac{d(\Delta H)}{dT} = -6.6 - 0.0016T + 0.0000012T^2 \quad (51)$$

If ΔH^1 is the experimentally determined reaction heat at some temperature T and ΔH is the reaction heat at the desired temperature of 823°, then from the above equation there is obtained an integration

$$\Delta H = \Delta H^1 \frac{-6.6}{1}(823 - T) \frac{-0.0016}{2}$$

$$(823 - T)^2 + \frac{0.0000012}{3}(823 - T)^3$$

or

$$\Delta H = \Delta H_1 - 6.6(823 - T) - 0.0008$$

$$(823 - T) + 0.0000004(823 - T)^3 \quad (52)$$

Heat of Reaction (ΔH)—According to Lewis and Randall, p. 571 (Thermodynamics and the Free Energy of Chemical Substances) the heat of reaction is equal to 18,300 calories at 291° (18° C.). (It should be remarked here that these authors employ ΔH to denote an endothermic and $-\Delta H$ an exothermic reaction, which is the reverse of usual practice. In the present treatment the usual practice has been followed, and hence the reaction as written is endothermic.)

Upon inserting this value in place of ΔH^1 in Equation 52 and upon putting T=291°, the resulting equation for reaction heat is

$$\Delta H = -18{,}300 - 6.6(532) - 0.0008(532)^2$$

$$+ 0.0000004(532)^3$$

or $\Delta H = -22{,}000$ calories at 823° (550° C.). Where ΔH, being negative, denotes an endothermic process.

Entropy of C, H_2 and CH_4—Lewis and Randall give 1.3 and 29.44 calories per degree for the molan entropy of C (graphite) and H_2, respectively, at 298° (25° C.).

Specific heat and vapor pressure measurements on methane at low temperatures, sufficient to enable the molal entropy to be obtained directly for ordinary temperatures, are available in the literature, but in this case the writer has calculated indirectly from certain data given by Lewis and Randall that the molal entropy of methane is equal to approximately 40.6 calories per degree at 298° (25° C.).

Therefore, the entropy change of the reaction at 298° (25° C.) is equal to $40.6 - (1.3 + 2 \times 29.44) = 18.6$ calories per degree.

Rate of Change of Entropy Change with Temperature.—According to Equation 34 the rate of change of the entropy change with temperature is equal to

$$\frac{d(\Delta S)}{dT} = \frac{\Delta C_p}{T} = \frac{-6.6}{T} - 0.0016 + 0.0000012T \quad (53)$$

Now if ΔS^1 is the known entropy change at some temperatures T, then ΔS, the entropy change at the desired temperature of 823°, is given by the equation

$$\Delta S = \Delta S^1 - 6.6 \times 2.303 \log \frac{823}{T} - 0.0016 \frac{1}{1}$$

$$+ 0.0000012 \frac{(823 - T)}{2}(823 - T)^2 \quad (54)$$

Entropy Change (ΔS)—Upon substituting the known value of -18.6 for ΔS^1 in Equation 54 and 298° for the corresponding temperature T, the desired entropy change of the reaction becomes,

$$\Delta S = -18.6 - 6.6 \times 2.303 \log \frac{823}{298}$$

$$- 0.0016(532) + 0.0000006(532)^2$$

or $\Delta S = -28.7$ at 823° (550° C.).

Free Energy Change (ΔF)—According to Equation 24

$$\Delta F = \Delta H - T\Delta S$$

and therefore can be calculated by substituting for ΔH and ΔS the values obtained.

$$\Delta F = 22{,}000 - T(-28.7)$$

$$= -22{,}000 + (823 \times 28.7)$$

or $\Delta F = -1{,}620$ calories at 823°

where ΔF, having a negative value indicates a decrease in free energy.

Equilibrium Constant.—From Equation 49

$$\log K = \frac{\Delta F}{4.58\,T}$$

and hence upon substituting F=1,620 and T=823,

$$\log K = -\frac{1{,}620}{4.58 \times 823}$$

or $\log K = 0.44$
or $K = 2.8$ at 823° (550° C.).

According to this calculated value of K, the equilibrium constant at 823° (550° C.) the following relation holds:

$$\frac{p^3_{H_2}}{(1 - P_{H_2})} = 2.8$$

Dropping subscripts,

$$P^2 = 2.8 - 2.8\,P$$

$$(P + 1.4)^2 = 2.8 + 1.96 = 4.8$$

$$P + 1.4 = 2.2$$

$$P = 0.80$$

Hence at a temperature of 823° K. (550° C.) the equilibrium mixture at atmospheric pressure contains 80 per cent hydrogen and 20 per cent methane. No measurements have ever been made for the methane-hydrogen-carbon equilibria at as low a temperature as 550° C., but that the result would follow, given time enough, is shown by the calculated products. As already stated, the third law tells one nothing about rate of the reaction.

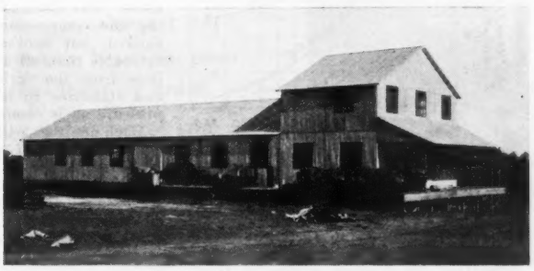
[1] Degrees Kelvin = 273° + °C.

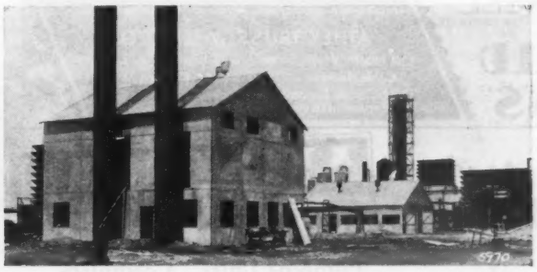
[2] A. W. Francis gives $F = -20{,}000 + 26.2T$, using the more accurate data of Dixon, Campbell and Parker. (See Ind. Chem. 19, 277, 1928). Hence $\Delta F = -1{,}563$ calories at 823°.

Sturdy and Durable Industrial Steel Buildings . . .

BRADEN *Sectional* Steel Buildings are manufactured of materials selected for durability. The construction is such that they are unusually sturdy without rendering single sections unduly heavy. Since these "ready-made" buildings are obtained at minimum cost in time and money, they offer utmost value . . Write, wire or phone for information regarding BRADEN Sectional Steel Buildings in sizes and types for any industrial purpose.

BRADEN STEEL CORPORATION TULSA OKLA TRADE MARK





BRADEN

SECTIONAL STEEL BUILDINGS

MINERAL AND OIL LANDS
GEOPHYSICAL PROSPECTING

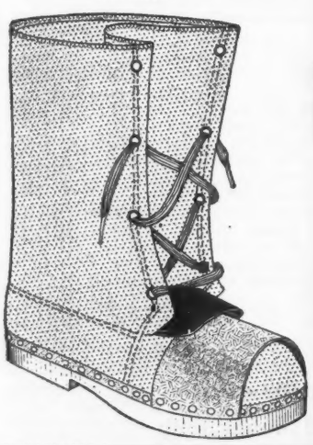
Swedish American Prospecting Corp.
26 Beaver Street, New York, N. Y.
2608 Baldwin Street, Houston, Texas
Cable Address: Isopotent, New York.

Swedish American Prospecting Co. of Canada, Limited
Lumsden Building, Toronto 2, Ont.

Aktiebolaget Elektrisk Malmletning
(The Electrical Prospecting Co.)
Wahrendorfsgatan 4.,
Stockholm, 16, SWEDEN
Cables: Prospecting, Stockholm

In Association with SEISMOS LIMITED, Hanover, Germany

Patented



Here's a Real Boot

. . . . designed and constructed especially for that unusually hard and hot "*still cleaning*" service.

Made with a double heel and is worn over a shoe. The heavy canvas uppers are asbestos dipped — the galvanized iron toe cap is a protector against hot metal, coke or falling objects. The leather tab keeps hot particles from lodging in canvas. The Wooden Sole is non-conductive to heat or water. It is a real SAFETY BOOT.

Write for a sample.

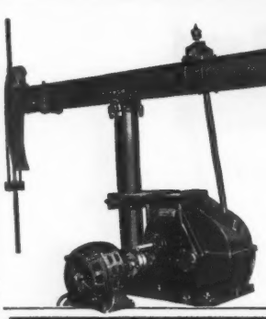
Reece Wooden Sole Shoe Co., Inc.
Columbus, Nebraska

Athey TRUSS WHEEL

OIL FIELD WAGONS

ATHEYS are all steel general utility wagons for use behind tractors, either singly or in train. Carry maximum 10-ton loads under all operating conditions. They are the modern, economical means for hauling heavy loads. Made in 10, 15 and 20-ton capacities. Write for full information.

ATHEY TRUSS WHEEL CO.
130 North Wells Street .. Chicago, U. S. A.
Cable Address; "Trusswheel," Chicago
The Baldwin Locomotive Works,
Foreign Representatives, Philadelphia, Pa.



AMERICAN
AURORA, ILL.

Ask for catalog on American Pumping Units. A complete line for various depths and capacities.

C. S. CARTER,
Sales Representative
711 Mid-Continent Bldg., Tulsa, Okla.

THE AMERICAN WELL WORKS
General Offices AURORA, ILLINOIS *and Factory*

THE MAN YOU WANT

IS AVAILABLE SOMEWHERE, WHETHER HE BE SUPERINTENDENT, ENGINEER, OFFICE ASSISTANT OR FIELD WORKER.

AN ADVERTISEMENT IN THE OIL AND GAS JOURNAL CLASSIFIED COLUMNS WILL LOCATE HIM.

The OIL and GAS JOURNAL
PRODUCING REFINING ENGINEERING MARKETING
TULSA, OKLA.

NEW TYPE KNOCK TESTING APPARATUS

(Continued from Page 190)

intensity of detonation by means of a millivoltmeter needle. Figure 3 shows the circuit used. The bouncing pin current flows through a fine resistance wire placed in such relation to a thermocouple of definite size that a continuous nonfluctuating indication of temperature is obtained which is proportional to the square of the average knock intensity as measured by electrolysis. Among the advantages of the knock intensity meter over the electrolytic cell may be enumerated:

1. Greater percentage of scale indication for a given difference in intensity of detonation.

2. Rapid determination of the air-fuel ratio for maximum knock, since the location of this point requires only the continuous variation of the float level until maximum needle deflection is obtained.

3. Greatly decreased time required for the testing of samples. By actual comparative test it is possible to rate three times as many samples on the new machine as on the old in a given length of time.

Measurement by Electrolysis

Figure 4 shows the circuit provided for the measurement of knock by electrolysis in case it is desired to use this method. A switch located on the panel permits the rapid change from one system to the other. The sliding tap on the resistance mounted on the rear of the panel permits any percentage of maximum scale reading to be obtained for a given knock intensity on either the electrolytic cell or the knock intensity meter.

Both cylinder temperature and intensity of detonation have an effect on the comparative rating of some types of automobile fuels and of almost all types of aviation fuels. For this reason it has been found necessary to specify compression ratio, compression pressure, jacket temperature and spark advance for both

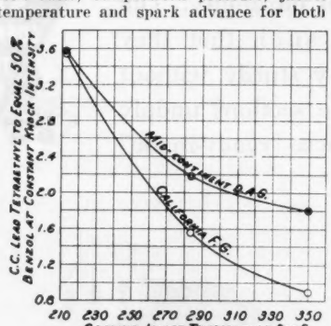


Figure 6—Variation of benzol-lead tetraethyl ratio in aviation gasolines due to change of engine temperature.

motor and aviation fuels. The new type engines are uniform in their characteristics and produce the same intensity of detonation for a given setting of these variables.

Due to the variation in altitude, and consequently barometric pressure, in various parts of the world, the specification of a fixed throttle opening does not necessarily insure a fixed compression pressure. With each of the new machines is furnished a compression pressure indicator of the type shown in Figure 5. This instrument is standardized in all its parts and permits the setting of the throttle for a definite compression pressure regardless of barometric pressure.

Some idea of the enormous effect of cylinder temperature on the comparative ratings of fuels may be obtained by reference to Figure 6 which shows the variation of the benzol-lead tetraethyl ratio in two aviation gasolines due to changes in engine temperature, all ratings being at constant intensity of detonation. It will be noted that the benzol-lead tetraethyl ratio changes 400 per cent for a temperature change from 212 to 350° F.

Independent laboratories using the new apparatus have demonstrated their ability to check the knock rating of aviation gasolines at 350° F. jacket temperature within 0.1 c.c. lead tetraethyl.

INCREASED DEMAND FOR PARAFFIN WAX FORECAST

(Continued from Page 254)

been distributed throughout the year, covering very hot and very cold days, and the practicability of the new containers has been proved, we believe, in every respect," said President Reilly of the Sealed Containers Corp.

"The co-operation on the part of the Borden company and the Sheffield Farms Co., the two largest distributors of milk in the world, signifies that sealcones have arrived as the modern method of milk distribution. Sealcones were recently described by United States Senator Royal S. Copeland, former health commissioner of New York, as a 'unique fulfillment' of the requirements and recommendations of the committee appointed by former Governor Alfred E. Smith some years ago, of which Doctor Copeland was chairman, which found that the 'highest ideal in milk delivery is a suitable and practical single-service container, freshly made in the milk plant, absolutely sterilized and then closed with a seal which cannot be broken without detection'."

Advantages which the sealcone is said to possess are many. This paraffin-impregnated container is so strongly constructed and so thoroughly protected that the milk actually is sealed in. Each one is sterilized inside and outside with a heavy coating of purest paraffin, insuring against any taste of paper in the milk. Owing to their construction the sealcone acts as a nonconductor of heat, thus helping to keep milk sweet. On ice or in water sealcones stay firm and crisp indefinitely. They are so flexible that even if accidently dropped there is small danger of their breaking. On account of the heavy paraffin coating the container not only is sterile, but it does not soak up the milk it contains.

LOWERING CRUDE OIL STORAGE LOSSES

(Continued from Page 118)

The stripped gas still contains about 1 gallon of recoverable gasoline per 1,000 cubic feet and is therefore passed through an oil absorption plant and completely denuded before being used for fuel purposes. The alternative method of increasing the compression pressure was considered, but proved, in this case, less favorable than oil absorption. The gasolines from the various stages are mixed and stabilized in a bubble tower under pressure as is common practice.

Each desorber will handle approximately 30,000 bbls. of crude oil per day of 24 hours, taking off from 35 to 60 cubic feet of gas per barrel according to the season and the purpose for which the oil is intended to be used. It will be appreciated that in winter, the lower atmospheric temperature permits more fuel gas to be carried in solution in the oil than is possible in the summer months, and the conditions at the degassing plant are adjusted accordingly.

Method of Control

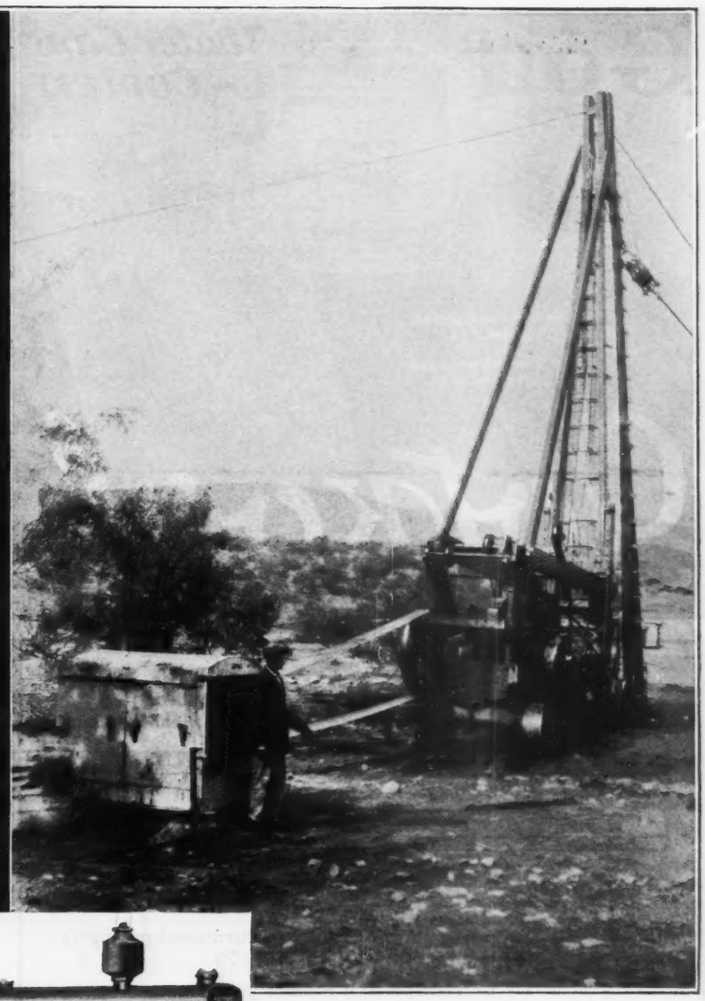
The plant is controlled on the gravity of the outgoing oil. An accurate distillation test has, however, been devised which enables the gas content of ingoing and outgoing oil to be measured. This need only be used as an occasional check test, as it has been found that temperature and vacuum can be readily maintained and the gravity of the outgoing oil is a reliable indication of steady running conditions.

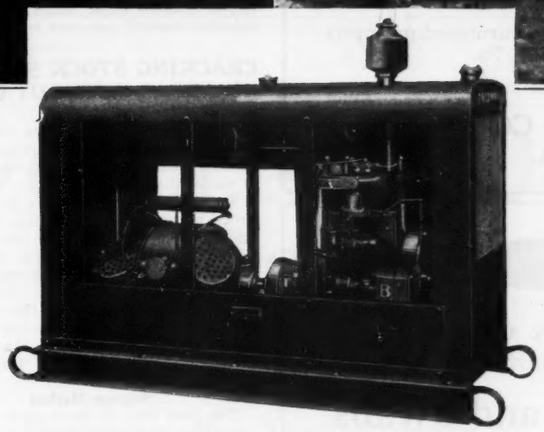
Refinery Operations

In addition to the almost complete elimination of storage losses, the degassing of the crude before distillation has reacted favorably upon the processing of the oil. In the first place the gas evolved during distillation has been reduced to one-tenth of its former figure. Prior to the introduction of degassing, a barrel of crude would evolve some 35 cubic feet of uncondensable gas as compared with

"During My 53 Years Experience in the Oil Fields

This is the Finest Running Lighting Plant I Ever Saw"





The Novo Flud-Lite Unit comes completely enclosed in a steel lock-up house—completely arranged for ready portability—in sizes of from 1¾ K. W. to 5 K. W.

You can gamble that a man with 53 years' experience in the oil fields knows the difference between good, bad and indifferent lighting units.

Especially the kind of a man that is active enough at the age of 76 to hold a position as Superintendent of the Drew Beams lease, on which there are seven wells.

And when this man, Mr. A. H. Supple, says that the Novo 1¾ K. W. Flud-Lite Lighting Unit, used on a Spudder outfit of the Drew Beams, is the "finest running plant he ever saw" —you know it's been compared with the "class" in the field.

Here are a few of his reasons:

Flickering and burned-out bulb dangers are eliminated—for the engine speed is automatically controlled within 5%—and voltage is held to a variation of not more than 3 volts.

Novo Flud-Lite Lighting Units are built with surplus power to operate grinders, blowers and other auxiliary machinery, in addition to the standard Westinghouse Generator.

The Novo Timken Roller Bearing engines used to power these outfits are vibrationless in operation—require only a quarter turn to crank. And because of their anti-friction power, fuel consumption is exceedingly low.

SEND THE COUPON FOR COMPLETE DETAILS

NOVO
Flud-Lite Lighting Units

Please send me complete information on the Novo Flud-Lite Generator.

Name.....

Address.....

City.....

State.....

NOVO ENGINE COMPANY
240 Porter Street, Lansing, Mich.
Clarence E. Bement, Vice-Pres. and Gen. Mgr.
Sold and Serviced by National Supply Co.

Gott Water Cans & Coolers

Built to last... you will always be assured of a fresh supply of pure water, when you have a GOTT Water Cooler. Order one now from your supply store.

GOTT Water Cans 1½ gal; 3 gal; 5 gal; and 10 gal.

GOTT Water Coolers 3 gal; 5 gal; 8 gal; 10 gal; and 20 gal.

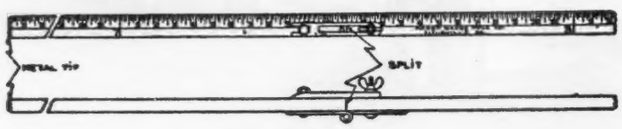
Gotkool

H. P. GOTT MFG. CO. - Winfield, Kansas

KEEP PURE DRINKING WATER ALWAYS HANDY

GAUGE POLES

Any Length For Oil Measurements



"MARSH-JOINT"

For sale by oil country supply houses or furnished promptly by the factory at Titusville, Pa.

Correspondence Solicited

MARSH GAUGE POLE COMPANY
TITUSVILLE, PA.

C. M. HEETER, SONS & CO., INC.
MAIN OFFICE AND WORKS, BUTLER, PA.

"Heeter's" Packers and Swabs

Heeter's Improved Patent Swabs, Corrugated Friction Sockets, Wire Line Pumping Outfits, Sand Pumps and other Gas and Oil Well Materials

Leases, Royalties, Production

are sold quickly, profitably, through The Oil and Gas Journal Classified Wants. Each week many of our classified users write us attesting to that fact.

Journal classified ads can get results for YOU. Send us a list of your holdings today, including as great a variety as possible so that a large number of readers may be appealed to. Oil companies and prospectors are looking for new acreage every day. You may have just what they want. Give them an opportunity to buy it from you by advertising now.

The Oil and Gas Journal
Classified Wants Department

3 to 4 cubic feet when running on degassed crude.

It is, of course, well known that the presence of considerable quantities of permanent gases greatly reduces the efficiency of heat transfer in tubular condensers, so that the effect of degassing the crude has been to enable the condensers to operate under highly efficient conditions with a consequent economy in the quantity of cooling water to be pumped. This is by no means a matter of minor importance in a country where cooling water is at a minimum temperature of 85° F. in summer. The comparatively small quantity of gas obtained during distillation is bulked with the gas from the desorbers and passes through the gasoline recovery plant.

Another beneficial effect of the process lies in a saving of chemicals and a reduction in corrosion troubles. It must be explained that the crude oil is saturated with hydrogen sulphide to the extent of 0.6 pound of H_2S per barrel and the large quantities of gas previously obtained at the worm ends contained some 12 per cent of H_2S by volume. Degassed crude, on the other hand, has lost the major portion of its hydrogen sulphide content at the degassing plant, and on distillation the still gases contain only 2 per cent. Now the presence of H_2S in distillates necessitates immediate soda washing, since otherwise aerial oxidation takes place yielding elemental sulphur which can only be removed with difficulty; much less caustic soda has been required for this purpose since the commissioning of the degassing plant.

It is unnecessary to dwell upon the elimination of the fire risk inevitably associated with the storage of large quantities of wild crude. It is, however, interesting to note that the method has resulted in an enhanced yield of more stable gasoline.

The whole of the vapors which were formerly lost in storage and never reached the refinery at all are now recovered and stabilized and when blended with the straightrun gasoline yield a larger quantity of a motor spirit which has a higher volatility and 97 per cent recovery.

CRACKING STOCK STORAGE IN AREAS WITHOUT CRUDE

(Continued from Page 122)

miles—a five-year peace time supply, and probably sufficient for the requirements of national defense."

To those who regard as fantastic a program providing for building up a storage of 100,000,000 bbls. of oil it should be pointed out that there are more than 650,000,000 bbls. of oil in storage now in the United States. These stocks have been built up merely in the course of business and without any set program being adopted to that end. In fact, the industry would be glad if these stocks were much less.

Storage Method

The best way to store such an emergency supply of fuel oil would be in underground reservoirs. These are much in use in California and their construction up to capacities of 1,000,000 bbls. and more each is so common as to be standard practice. The concrete underground storage has two advantages over steel storage. In the first place it costs only a fraction as much and more important, from a military standpoint, underground concrete tanks could not be detected and bombed by aviators as could steel tanks above ground.

Both from the standpoint of evaporation loss and fire hazard, the storing of large quantities of heavy oil obviously is preferable to storage of finished gasoline or gasoline distillate. It is pointed out by Doctor Egloff that such underground reservoirs should be distributed over the country and connected by suitable pipe lines, equipped with pumping stations, rather than be bunched close together. This would make it possible if part of a country was captured by the enemy for the oil to be pumped out of reservoirs underlying it into reservoirs still in possession of the army of the defense.

Cost of Program

Assuming that the cost of fuel oil laid

ARMSTRONG
Chain Pipe Tongs

Design
Big hardened steel bolt and nut hold jaws firmly to bar. Heavy forged-in lugs greatly increase bearing of jaws on handle and serve as chain guides, prevent jamming.

Handles
Handles are forged from high carbon steel. Have both stiffness and spring.

Jaws
Jaws are drop forged from special steel, treated, hardened and tested for toughness and lasting qualities.

Chains
Each chain is *proof-tested* to 2/3 specified strength (1,200 lb. to 40,000 lb.). Each bears the Arm-and-Hammer seal, evidence of proven strength.

EXTRA strength—a positive safety factor for every emergency—these come with ARMSTRONG Chain Tongs. Though comparatively new in the oil fields, ARMSTRONG Drop Forged Tools have for 39 years been supreme in machine shops and tool rooms, over 96% of which use ARMSTRONG Tools. This standing has been built on a quality that you can know only by using an ARMSTRONG Tool.

Write for Catalog P-10, showing and describing a full line of improved tools.

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
330 N. Francisco Av., CHICAGO, U.S.A.

Exhaust Heads

—save roofs, buildings, and boilers, and they last a lifetime. Made in two sizes and types.

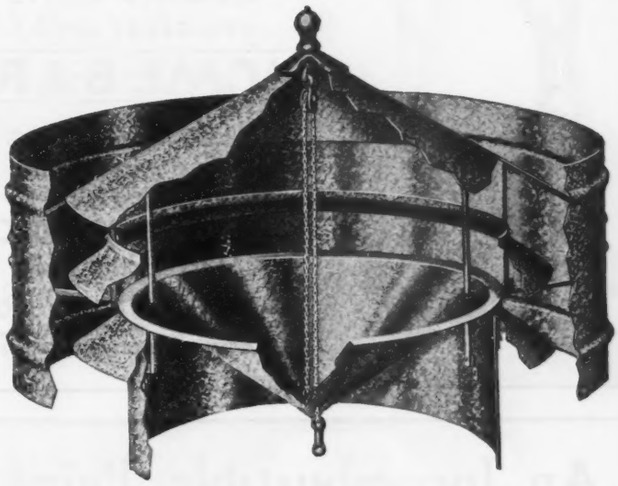
Oil Filters

—are cutting lubricating costs in thousands of plants. A type for every purpose and capacity.

Why They Use 'Em

Hundreds of prominent industrial plants are using Burt Cone Damper Ventilators. Using them because they boost plant efficiency by providing *real* ventilation. Using them because they permit no down drafts, have no moving parts, are absolutely storm-proof, have fusible links for fire protection, have guaranteed maximum exhaustive capacity—and are sold at practically the same price as cheap makeshifts.

The Burt Cone Damper Ventilator contains no black iron. Made of heavier steel well braced and stayed. Galvanized stock throughout . . . In fact all the best ideas of 30 years' experience are incorporated in this unit. Orders filled day received. You will like the Burt service.



Burt
CONE DAMPER VENTILATOR

The **BURT MFG. Co.**
Ventilators-Oil Filters-Exhaust Heads
929 S. High St. Akron, Ohio

Shreveport-El Dorado Pipe Line Company, Inc.
Shreveport, La.

Refiners and Distributors of

SPARCO
Anti-Knock Gasoline
MOTOR GASOLINE, NAPHTHAS, KEROSENE
GAS OILS and FUEL OILS

Refinery and Sales Department
Shreveport, La.

The simplest CLAMP with greatest grip!

ACME B·& R·

One of the 148 types of Drilling and Fishing Tools made by ACME FISHING TOOL CO. at Parkersburg W·Va·

ESTABLISHED IN 1900

Distributors and Dealers in all active fields

An Incombustible Paint

Has been exposed to over 1200 deg. Far. for over two years.

Volco

Holzapfels Heat Proof Protective

Send for Circular to

International Compositions Company, Inc.

25 Broadway, New York

LUFKIN

"ATLAS" TAPE

Accurate — Extra Heavy

Tapes and rules for every measuring requirement of the oil industry.

THE LUFKIN RULE CO.

SAGINAW, MICH.

WINDSOR, CAN. NEW YORK

Send for Catalog

NATIONAL PETROLEUM ENGINEERING COMPANY

Engineers & Geologists

TULSA, OKLAHOMA

APPRAISALS
REPORTS-COMMERCIAL & TAX

SURVEYS
ESTIMATES OF OIL RESERVES

AN EXPERIENCED OIL FIELD ORGANIZATION

The Real Reason for It

The Oil and Gas Journal uses extra large pages in order to give you complete information every week with oil field maps, well-logs, refinery and plant designs, flow charts, tables and illustrations.

Each issue contains illustrated engineering articles describing practical and more economical methods of Exploring, Producing, Refining, Marketing, and Transporting Crude Oil and its Refined Products.

down in the tanks, plus the investment involved in constructing the tanks, pipe lines, pumping stations, etc., would run to $2 per barrel—figuring 6 per cent on the investment would mean a carrying charge of $12,000,000 a year. It is conceivable that this cost would be far below that necessary to produce and refine oil from natural deposits to make a like amount of gasoline. In peace time the profits from the marketing of gasoline produced would easily justify this expenditure, while in war time, of course, the cost of defense is of no importance.

In case such a program were adopted by a government the money to finance it would be available from the national revenues while, because of the bearing of such a program on national defense, it is likely that government aid could in many cases be enlisted by private interests taking on such an enterprise.

While the cracking of such fuel oil would yield better than 50 per cent of gasoline, the by-products would be fuel oil or coke, and light distillate suitable for Diesel engine fuel would also be of great value. The cracking process can also be so operated as to produce gasoline, gas and coke only.

REFINERY COST VERSUS MARKETING QUOTATIONS

(Continued from Page 192)

cents a barrel is divided between skimming, cracking and depreciation; refinery office and general plant expense being distributed to skimming and cracking plants. Depreciation is based on the normal rates for equipment actually in use. From the total crude and manufacturing costs is deducted the realizable value of by-products, two (2) of which, namely, kerosene and fuel oil are salable and two (2) of which, namely, pitch fuel and fuel gas are used to operate the plant. From the total value of the by-products, which is based on present day selling prices, is deducted the costs of marketing the two (2) salable products at a pro rata cost per barrel of marketing all products. The net amount realized from the sale of by-products and of the products used in operating the plant reduces the total costs of crude oil and manufacturing expense that amount, leaving the remaining amount as the cost of the gasoline produced. The yield and cost is based on the production of U. S. Motor grade of gasoline.

The cost of producing a higher grade of gasoline would be increased because of a smaller yield and larger processing costs. To the unit of U. S. Motor gasoline produced is added the unit cost of shipping expense to determine a unit cost of gasoline leaving the refinery. The selling price of U. S. Motor gasoline is 6½ cents a gallon which results in an excess of cost over selling price, or a loss of one-half cent a gallon. This results in a loss before taking into consideration marketing expense of $22,491. With selling and general expense added the loss is increased to $32,991 per month or a loss of $395,892 a year. With the same manufacturing cost and value of by-products presented using the price of 39 gravity crude oil effective since the recent price change of $1.29 and a selling price of U. S. Motor gasoline of 6 cents a gallon, the result would be a loss of $8,295 a month or $99,540 a year.

In considering the yield and cost statement presented it should be borne in mind that these figures represent a condition which exists in very few refineries today. If the refiner is fortunate enough to have the most efficient equipment for refining crude oil, he probably also has a large investment in equipment that is obsolete. A refinery built today with only the most up to date equipment would, in a comparatively short time, replace some of the equipment with the extra expense necessary making the change which would result in an increased cost of products produced from such a refinery. The true cost of producing gasoline and other refined products from crude oil must take into consideration the refinery equipment as a

OFFICIAL AAA HOTEL

OFFICIAL HOTEL Southern California Automobile Club Southern Unit

EL PASO'S NEWEST AND FINEST

El Paso Headquarters:
National Aeronautical Association

300 ROOMS . . $2.50 all outside with bath up

Only hotel in city using soft water

When in El Paso meet your friends in our Lobby and Lounge. Make yourself at home whether you stop with us over night or not.

HARRY L. HUSSMANN, *President*

HOTEL HUSSMANN

TRADE MARK REG. U.S. PAT. OFF.

"On the Plaza"

EL PASO / TEXAS

TOURISTS COME IN AS U. R.

"You'll Be Surprised"

FOR USE IN OIL LINES

WHILE WELDING

Safety Gas Main Stopper Co.

523 Atlantic Ave., Brooklyn, N. Y.

PATENTS *Write for Free Book*

MUNN & CO.

Associated since 1846 with the Scientific American
514 Scientific American Bldg., *Washington, D. C.*
1551 Scientific American Building
24 West 40th Street, *New York City*
1303 Tower Building, *Chicago, Ill.*
656 Hobart Building, *San Francisco, Calif.*
511 Van Nuys Bldg., *Los Angeles, Calif.*

Cables: Ceallach, New York
Telephone: Whitehall 8256

JOHN EOGHAN KELLY
Consulting Engineer
17 Battery Place, New York City, N.Y.
Pasaje Coloma 6, Guatemala, C. A.
Examination, appraisal, management, negotiation of petroleum properties, mines, natural resources. Exceptional facilities in Latin America.

Read the

Classified Wants Pages

232-233

MARLEY

Over 25,000 Marley Spray Nozzles are now being used by one of America's largest manufacturers in its many plants where cooling equipment is required.

NOZZLES TOWERS PONDS

THE MARLEY COMPANY

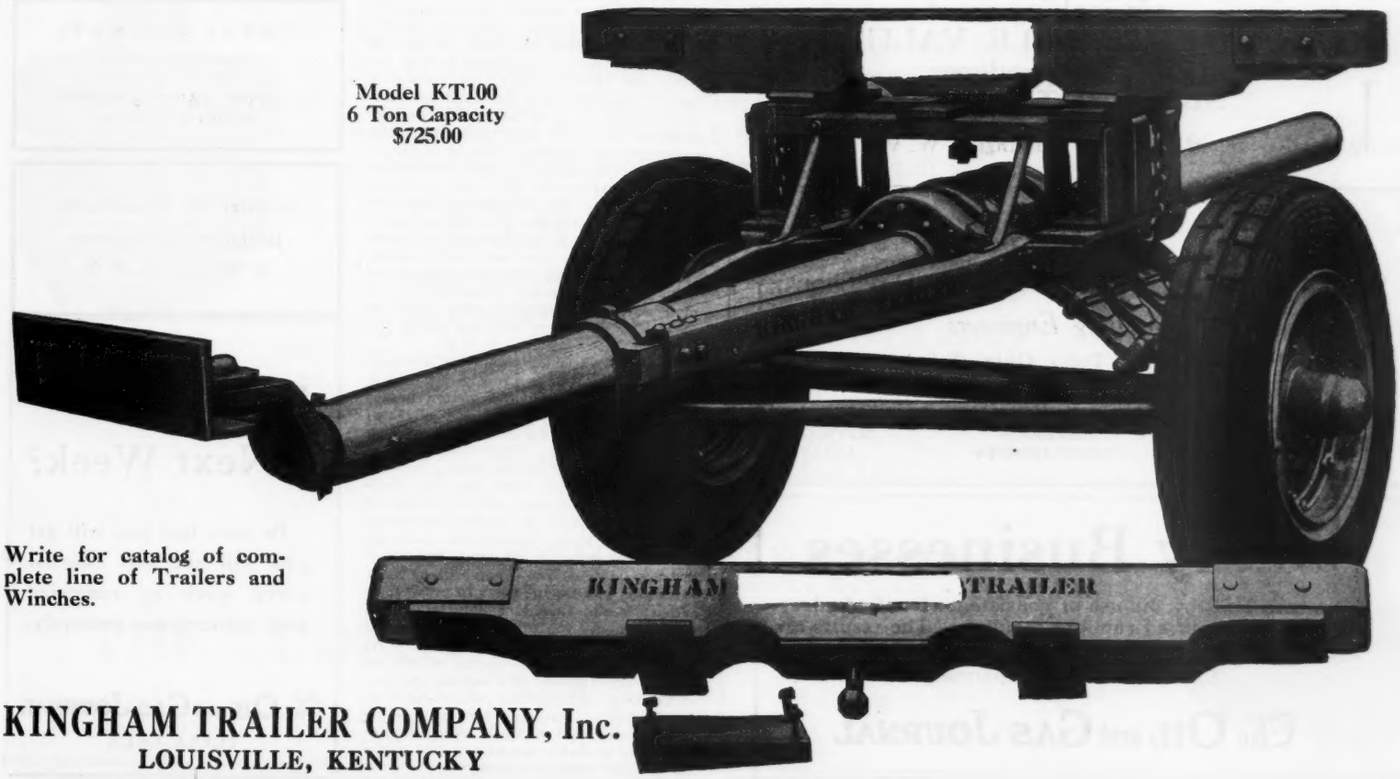
1737 WALNUT ST. KANSAS CITY, MO.

A LOAD BEHIND IS A TRIP AHEAD

KINGHAM TRAILERS

COVER THE WORLD

Model KT100
6 Ton Capacity
$725.00



Write for catalog of complete line of Trailers and Winches.

KINGHAM TRAILER COMPANY, Inc.
LOUISVILLE, KENTUCKY

McGregor Working Barrel Company, Inc.
Bradford, Pa.

Manufacturers of the McGregor Working Barrel and Plunger Barrel for all size tubing in brass or steel in all lengths; Standard Steel Barrels for 2″, 1½″ and 1¼″ tubing in all lengths, Brass, ditto; Cast Iron Barrels for 2″ tubing; all size working valves, standing valves, two cup drop valves and the MAC Steel, Brass, Bronze and Stainless Steel Balls and Seats in all sizes.

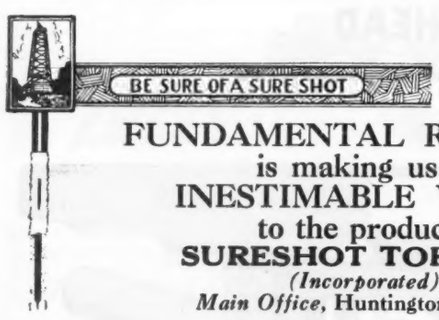
All barrels are guaranteed to have a nice smooth working barrel finish on the inside.

TORSION BALANCE
and
Magnetometer Surveys

GEORGE STEINER
Petroleum Bldg., HOUSTON, TEXAS
and
Petroleum Securities Bldg., LOS ANGELES, CALIFORNIA

Report by
Donald C. Barton
Consulting Geologist and Geophysicist

Sole American Representative
Suss Visual—Suss Rybar Automatic Torsion Balances



CALL OUR NEAREST SHOOTER

FUNDAMENTAL RESEARCH
is making us of
INESTIMABLE VALUE
to the producer
SURESHOT TORPEDO
(Incorporated)
Main Office, Huntington, W. Va.

WALTER J. PODBIELNIAK—PAUL M. RAIGORODSKY
Consulting Engineers
Philtower Bldg., Tulsa, Okla. Tel. 4-7258

NATURAL GASOLINE PLANT DESIGN AND OPERATION
ANALYTICAL AND RESEARCH LABORATORIES
FRACTIONAL DISTILLATION ANALYSIS

Many Businesses

have been built by the use of consistent classified advertising. Keep your ad running regularly. The results are accumulative.

Classified Wants Department

The Oil and Gas Journal

whole if the net results from operations, as shown by the profit and loss statement, are to be satisfactory. The cost of producing gasoline as presented is materially increased if the plant is not operated to capacity and the equipment is not of the most efficient type.

Other Methods

Applying other methods of determining cost of gasoline, using the figures presented, a very small variation was found as follows:

By the method which applies in equal proportion the profit (or loss) per gallon on all products sold, the cost of gasoline leaving the refinery is .0693.

By the method which distributes the profit (or loss) on the weighted average of gallons of all products sold at the average selling prices, the cost per gallon of gasoline leaving the refinery is .0698.

The cost of gasoline determined by the two (2) methods referred to above compared with the cost of gasoline leaving the refinery by the by-product method of .0701 is so small that the effect on the selling price of gasoline based on the cost would be insignificant.

Much good can be accomplished toward correcting the present day misunderstanding existing among refiners as to the actual cost of producing gasoline and other products from crude oil if a more careful consideration is given by the officers of the refining companies, as well as plant superintendents and foremen, to their system of cost accounting and a careful study and analysis of cost accounting statements. Results of refinery operations can only be shown by properly prepared cost statements. Careful analysis of the costs of each department should be made by the foreman in charge of the department, as well as the plant superintendent, as it is only in this way that the department can be operated at a minimum cost. In the majority of cases the foremen of a refinery and, in some cases, the plant superintendent do not have the proper accounting knowledge to analyze cost statements. If this condition exists, time can profitably be spent in assisting them to secure the desired results.

Standard Costs

Probably the method in use today which best produces these results is known as "standard costs." While the standard system of cost finding cannot be applied to a refinery in as much detail as it can to some other manufacturing establishments, the principle can be employed to secure the same general effect. By the standard cost method a set of standard costs, in detail for each department of a refinery, is prepared with the aid of the superintendent, plant engineers and foremen. This set of standard costs is based on past experience and the experience of other refiners. Variations in the standard costs thus prepared are provided for unusual operating conditions such as decrease in crude runs, increase in labor and crude prices, etc. When actual costs are determined from month to month a comparison is made with the standard costs and the variations shown in red and black figures.

The superintendent and his foremen by having helped to prepare the standard cost figures have a better understanding of what is expected of them and will have no difficulty in analyzing the actual figures. They will feel that the standard cost figures are a part of their work. They will also feel their responsibility for any costs in excess of the standard costs by having previously agreed that their departments could be operated at the costs set out in the standard cost statements. They will be more interested in reducing costs to prove their efficiency and should be able to explain to the satisfaction of the superintendent any increases over the standard. By permitting the men in charge of the operating departments of a refinery to have a voice in determining what shall be considered as standard for the coming months they will realize a responsibility that they probably would not feel under the present systems in use.

DEPENDABLE TRANSPORTATION
is assured through
Shippers' Car Line Tank Car Leasing Service

Tank Cars for all purposes.

Ample maintenance facilities.

Western Office
Wright Building,
Tulsa, Okla.
Telephones: 5—1174
5—1175

H. H. THIESEN
Car Accountant
I. M. TURNER
Western Representative

MAIN OFFICE
SHIPPERS' CAR LINE CORPORATION
30 Church Street
New York City
Telephone: Cortlandt 8110

ARTHUR C. BROWN
SOLICITOR OF UNITED STATES AND FOREIGN PATENTS
412 KENNEDY BLDG.
Tulsa, Okla.
Mr. Fred Krueger
in charge
Phone 4-2319

TEXAS OIL MAPS
County and District Catalog on Application
HEYDRICK MAPPING COMPANY
Wichita Falls, Texas

Chester W. Washburne
Geologist and Engineer
27 William St., N. Y.

How About Next Week?

Be sure that you will get your Oil and Gas Journal every week by renewing your subscription promptly.

The Oil and Gas Journal
TULSA, OKLA.

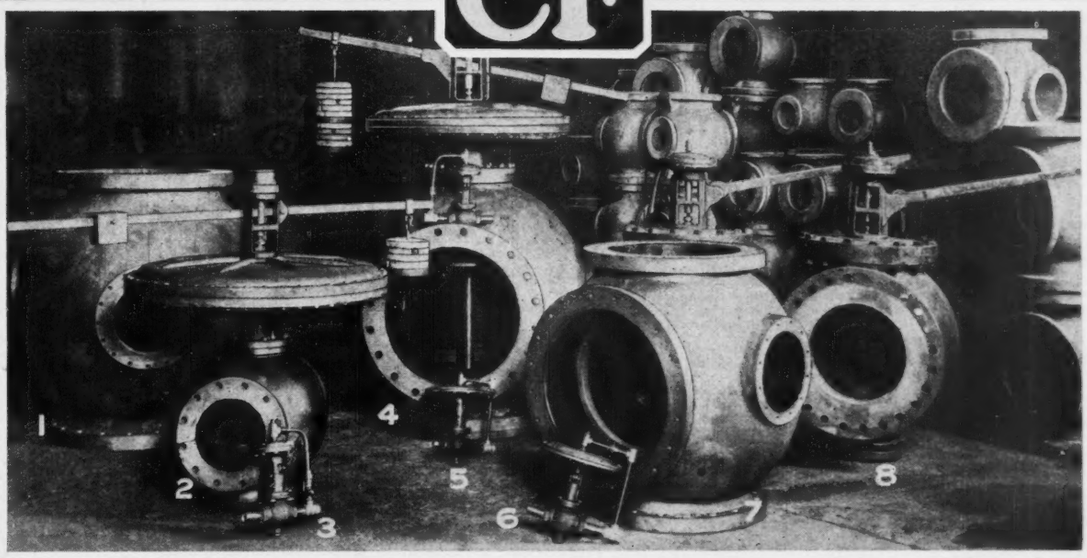
BIG ONES OR LITTLE ONES -A COMPLETE LINE OF DEPENDABLE CF

1 BODY FOR TWENTY-FOUR-INCH LOW PRESSURE REGULATOR.

2 A TEN-INCH DIFFERENTIAL REGULATOR.

3 A THREE-FOURTHS INCH HIGH PRESSURE REGULATOR.

4 TWENTY-FOUR-INCH DIFFERENTIAL REGULATOR FOR MIXING GASES.



5 ONE-INCH HOUSE REGULATOR.

6 ONE AND ONE-HALF INCH HOUSE REGULATOR.

7 BODY OF A TWENTY-INCH WEIGHTED ILLUMINATING REGULATOR.

8 A SIXTEEN-INCH HIGH PRESSURE REGULATOR.

REGULATORS

GREATER dependability and accuracy has been the Chaplin-Fulton goal for over forty years of experience in controlling gas pressure. Being today's standard is the result of ceaseless effort to improve design, materials, and workmanship.

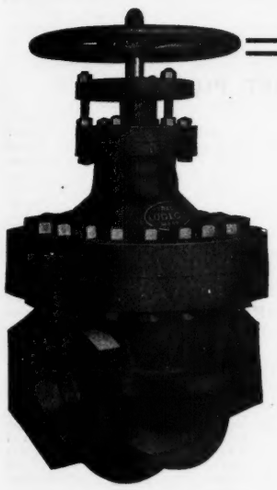
During this time there have been developed many varying types of regulators—enough to meet every major requirement of gas control.

Chaplin-Fulton therefore represents a most complete and a highly dependable line of products. Catalogues are available which describe each Regulator.

The Chaplin-Fulton Mfg. Company

ORGANIZED 1884 — OLDEST BUILDERS OF GAS REGULATORS IN THE COUNTRY. BUILT IN ALL SIZES, FROM 1 INCH TO 24 INCHES; FOR ALL SERVICES, 1 OZ. UP TO 2,000 LBS. PRESSURE TO SQUARE INCH.

28-40 Penn Avenue, Pittsburgh, Pa.



CATALOG ON REQUEST

IT'S IN KNOWING HOW!

As you travel throughout oil fields you will be surprised at the large quantities of Ludlow valves in use for refining, drilling and pipe line work. The reason for this is that Ludlow Valves are greatly preferred because they are manufactured by MAKERS THAT KNOW—gained during a long period of years in valve manufacture. Let us tell you more. Write for catalog.

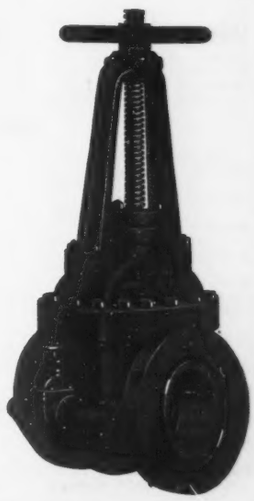
LUDLOW VALVES

IRON BODY
BRONZE MTD.
ALL IRON
CAST IRON

F O R

REFINERY
DRILLING
PIPELINE

HAND, CYLINDER AND ELECTRIC OPERATED



Distributed by

MID-CONTINENT SUPPLY CO.
HOUSTON · FORT WORTH

THE LUDLOW VALVE MFG. CO.

TROY, NEW YORK

KANSAS CITY CHICAGO NEW YORK BOSTON PITTSBURGH

Oklahoma-Kansas and Eastern Pipe Line Report

OKLAHOMA-KANSAS PIPE LINE STATEMENT FOR DECEMBER, 1929

Runs

Company—	Month (bbls.)	Dly. av. (bbls.)
Prairie P. L. Co.*	4,743,000	153,000
Gulf P. L. Co.	1,860,414	60,013
Texas P. L. Co.	764,991	24,677
Magnolia P. L. Co.	1,755,608	56,633
Empire P. L. Co.	1,710,379	55,173
Cosden P. L. Co.	891,112	28,745
Sinclair P. L. Co.*	3,131,000	101,000
Oklahoma P. L. Co.	3,245,063	104,679
Other lines*	5,549,000	179,000
Total December	23,650,520	762,920
Total November	22,612,786	753,760
Difference	1,038,034	9,160

Shipments

Prairie P. L. Co.†	6,410,734	206,798
Gulf P. L. Co.	2,075,333	66,946
Texas P. L. Co.	972,639	31,375
Magnolia Pet. Co.	2,231,518	71,984
Empire P. L. Co.	1,276,946	41,192
Cosden P. L. Co.	1,198,482	38,661
Sinclair P. L. Co.	3,548,337	114,462
Oklahoma P. L. Co.	3,227,980	104,128
Other lines*	6,138,000	198,000
Total December	27,079,969	873,546
Total November	26,807,089	893,570
Difference	272,880	20,024

Stocks

Prairie O. & G. Co.*	38,594,700
Gulf P. L. and Gypsy Oil Co.	9,922,691
The Texas Company	6,850,293
Magnolia Pet. Co.	7,594,960
Empire P. L. Co.	6,185,342
Mid-Continent Petroleum Corp.	3,421,846
Sinclair Crude Oil Pur. Co.*	19,914,000
Carter Oil Co.	9,361,892
Oklahoma P. L. Co.	3,711,384
Other companies*	24,703,000
Total December	130,257,108
Total November	131,355,426
Difference	901,682

*Estimated. †Prairie P. L. shipments include Texas crude oil and Sinclair shipments include Texas and Wyoming crude oil.

EASTERN PIPE LINE REPORT FOR MONTH OF JANUARY

Runs from Wells

In the following table will be found the regular receipts from wells by various pipe lines in New York, Pennsylvania, West Virginia, Ohio, Kentucky, Indiana and Michigan for December and January:

	Dec., '29	Jan., '30
Nat. Transit	451,222.47	439,729.00
S. W. Pa. P. L.	86,078.43	90,898.30
Eureka P. L.	364,779.55	367,547.89
Buckeye P. L. (Macksburg)	352,447.91	358,430.62
Buckeye P. L. (Cleveland)	9,993.96	10,647.91
Buckeye P. L. (Lima, etc.)	90,018.07	85,676.96
Indiana P. L.	4,720.28	3,482.83
Cumberland P. L.	189,528.30	182,383.51
N. Y. Transit	34,104.38	37,659.17
Tidewater P. L.	25,495.45	24,115.65
Pure Oil	277,181.96	305,214.10
Paragon Dev.	11,059.01	10,541.45
Stoll Oil Ref.	4,362.88	3,899.80
Bradford Trans.	410,395.25	432,916.17
Total	2,311,387.90	2,353,143.36
Daily average	74,560.90	75,907.85

Note—Paragon Refining Co. had other receipts of 156,022.98 bbls. Paragon Development had other receipts of 194.62 bbls. Indian Refining Co. had other receipts of 448,345.12 bbls.

Petroleum Deliveries

The following tables exhibit the shipments or regular deliveries of various pipe lines in New York, Pennsylvania, West Virginia, Ohio, Kentucky and Indiana for December and January:

	Dec., '29	Jan., '30
Nat. Transit	596,904.16	566,559.42
S. W. Pa. P. L.	328,907.79	292,868.36
Eureka P. L.	217,339.67	261,587.52
Buckeye P. L. (Macksburg)	209,875.38	188,277.50
Buckeye P. L. (Cleveland)	1,700.86	2,188.64
Buckeye P. L. (Lima, etc.)	895,636.25	900,037.30
Indiana P. L.	1,426,181.84	1,549,996.22
Cumberland P. L.	222,397.86	238,821.39
Southern P. L.	65,068.35	62,190.22
N. Y. Transit	164,584.79	189,945.65
Northern P. L.	201,259.03	196,645.06
Tidewater P. L.	510,717.25	392,513.08
Pure Oil	281,593.22	270,432.99
Paragon Ref.	172,635.39	157,944.28
Indian Ref.		461,663.58
Paragon Dev.	10,374.82	10,643.37
Bradford Trans.	468,781.60	486,905.56
Tuscarora Oil		517,121.55
Total	5,773,978.26	6,746,341.69
Daily average	186,257.36	217,623.92

Indian Refining Co. reported other deliveries of 461,663.58 bbls.

Gross Stocks

The gross stocks held by various pipe lines in the oil producing sections of New York, Pennsylvania, West Virginia, Ohio, Indiana and Kentucky and Indiana at the close of December and January:

	Dec., '29	Jan., '30
Nat. Transit	703,855.97	787,014.24
S. W. Pa. P. L.	531,541.47	511,042.96
Eureka P. L.	1,514,703.17	1,427,435.53
Buckeye P. L. (Macksburg)	476,862.16	609,936.03
Buckeye P. L. (Cleveland)	70,466.79	85,063.78
Buckeye P. L. (Lima, etc.)	4,286,296.85	4,764,964.92
Indiana P. L.	652,701.92	742,902.49
Cumberland P. L.	523,373.23	470,501.33
Southern P. L.	323,184.71	316,573.11
N. Y. Transit	216,820.01	310,237.52
Northern P. L.	437,683.50	569,978.67
Tidewater P. L.	868,271.09	915,732.49
Pure Oil	22,924.46	64,343.78
Paragon Ref.	31,470.68	29,271.88
Indian Ref.	156,562.07	142,994.08
Paragon Dev.	6,037.00	6,142.46
Tuscarora	267,197.45	266,285.45
Bradford Trans.	164,000.93	199,625.21
Total	11,253,953.46	12,220,045.93
Increase		966,092.47

Grades of Oil

The following table shows the amount of the different grades of oil held by the Eastern Pipe Lines at the close of December and January showing gross stocks of the above fields:

	Dec., 1929	Jan., 1930
Penna.	3,454,908.10	3,617,731.86
Lima	628,606.65	687,915.50
Kentucky	625,239.17	540,503.40
Mid-Continent	6,488,845.03	7,267,468.33
Illinois	44,576.48	55,156.42
Michigan	11,778.03	51,270.42
Total	11,253,953.46	12,220,045.93

Daily Average Runs

The following table shows the daily average runs of the Pennsylvania, Lima and Kentucky oil field for the past four years:

	1927	1928	1929	1930
Jan.	56,209	52,904	51,749	75,907
Feb.	61,298	57,002	51,833	.....
Mar.	63,247	57,485	54,252	.....
Apr.	60,927	56,812	58,444	.....
May	60,284	62,067	59,902	.....
June	62,757	58,230	58,833	.....
July	58,674	57,144	66,087	.....
Aug.	60,870	57,745	66,087	.....
Sept.	60,285	53,487	67,315	.....
Oct.	147,080	58,100	76,093	.....
Nov.	57,275	53,865	74,831	.....
Dec.	53,089	52,025	74,561	.....

Daily Average Shipments

The following table gives daily average shipments from the Pennsylvania, Lima and other fields for the past four years:

	1927	1928	1929	1930
Jan.	141,227	146,465	165,721	217,623
Feb.	138,534	167,368	159,387	.....
Mar.	133,777	158,883	161,474	.....
Apr.	140,227	172,935	169,737	.....
May	144,594	180,559	184,281	.....
June	149,772	188,024	185,404	.....
July	151,850	189,470	194,763	.....
Aug.	188,653	192,853	184,946	.....
Sept.	144,213	194,138	201,214	.....
Oct.	147,036	176,000	191,367	.....
Nov.	150,975	176,898	202,743	.....
Dec.	144,504	173,572	186,257	.....

Gross Stocks

In the following table will be found the gross stocks of the various lines of the Pennsylvania, Lima and Kentucky oil fields, including oil received from other lines at the close of each month for the past three years:

	1928	1929	1930
Jan.	12,276,710	7,596,564	12,220,045
Feb.	12,180,419	8,738,835	.....
Mar.	12,239,725	9,002,058	.....
Apr.	11,740,125	8,978,172	.....
May	11,602,468	8,903,560	.....
June	11,287,678	8,921,275	.....
July	10,819,331	9,211,595	.....
Aug.	10,236,743	9,440,643	.....
Sept.	9,660,910	9,443,067	.....
Oct.	9,229,709	9,441,101	.....
Nov.	8,366,553	9,868,538	.....
Dec.	7,539,555	11,253,953	.....

The Illinois Field

The following table gives the report of the Illinois Pipe Line Co. in Illinois:

Gross stocks, Feb. 1	2,368,730.24
Runs from wells	519,272.30
Other receipts	343,257.16
Regular deliveries	474,902.13
Other deliveries	449,109.92

The amount of Illinois oil run by the Tide Water Pipe Co. in January was 24,115.65 bbls. Deliveries were 23,391.80. Adding these figures to those of the Illinois Pipe Line Co. makes the runs and deliveries as follows:

	Runs	Deliveries
1930—		
Jan.	543,387.95	498,293.93
1929—		
Jan.	570,727.38	545,084.66
Feb.	517,320.17	503,387.70
Mar.	728,319.67	586,049.60
Apr.	515,374.27	654,297.96
May	608,981.60	673,812.83
June	568,454.70	818,845.97
July	611,106.79	828,159.44
Aug.	625,351.99	746,425.06
Sept.	582,457.66	669,947.72
Oct.	662,302.83	558,558.68
Nov.	565,108.75	427,064.63

Tide Water Pipe Co., Ltd., also delivered in January, 99,499.88 bbls. Oklahoma oil.

Franklin Pipe Co.

The following table exhibits the condition of the Franklin Pipe Line at the close of business for the months named and not counted in the stocks and averages reported above:

	Runs	Shipments	Stocks
1928—			
December	3,053.60	3,167.53	19,426.99
1929—			
January	2,099.90	.....	19,313.06
February	2,469.47	6,873.20	17,009.23
March	3,330.82	3,595.01	16,745.04
April	4,864.07	4,243.59	17,365.52
May	2,688.59	2,455.54	17,598.57
July	2,947.62	3,329.35	4,503.48
August	2,742.72	2,889.47	4,356.74
September	2,925.71	2,897.34	4,385.11
October	3,083.59	1,754.94	5,713.76

AVERAGE DAILY RECEIPTS OF CALIFORNIA OIL AT ATLANTIC AND GULF COAST PORTS

Average bbls. per day—	Atlantic Ports: Baltimore	Boston	New York	Philadelphia	Others	Total	Gulf Coast Ports: Galveston	New Orleans Baton Rouge	Port Arthur Sabine Pass	Tampa	Total	Total all ports
March	19,903	968	31,258	18,581	7,355	78,065	.....	.....	.....	.....	.....	78,065
April	16,667	....	32,333	13,233	2,234	64,467	.....	.....	.....	.....	7,333	65,300
May	16,226	2,416	31,326	10,806	2,129	62,903	.....	.....	.....	.....	....	62,903
June	14,866	3,167	23,100	10,300	6,100	57,533	.....	.....	.....	.....	....	57,533
July	15,387	4,806	34,290	19,388	2,452	76,323	.....	.....	.....	.....	4,161	80,484
August	20,389	3,129	35,226	18,903	5,548	83,194	.....	.....	.....	.....	12,161	95,355
September	19,433	....	31,834	11,900	6,200	69,367	.....	.....	.....	.....	4,800	74,167
October	9,065	4,677	42,065	12,000	9,677	77,484	.....	.....	.....	.....	4,097	81,581
November	18,900	3,167	41,667	14,699	3,767	82,200	.....	.....	.....	.....	2,400	84,600
December	12,968	....	46,129	13,613	7,225	79,935	.....	.....	.....	.....	2,335	82,290

AVERAGE DAILY IMPORTS OF PETROLEUM AT PRINCIPAL UNITED STATES PORTS

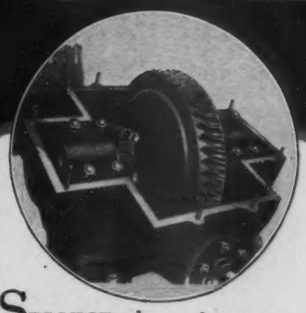
Average bbls. per day—	Atlantic Ports: Baltimore	Boston	New York	Philadelphia	Others	Total	Gulf Coast Ports: Galveston	New Orleans Baton Rouge	Port Arthur Sabine Pass	Tampa	Total	Total all ports
March	18,548	26,064	145,516	39,162	28,162	257,452	....	42,581	2,322	....	44,903	302,355
April	19,733	18,367	137,233	50,267	22,567	248,167	6,867	25,066	10,367	1,500	43,800	291,967
May	29,806	19,258	138,000	49,936	22,322	259,322	6,677	26,323	3,000	1,323	37,323	296,645
June	31,433	8,667	134,600	42,967	18,300	235,967	8,600	22,633	11,800	2,033	45,066	281,033
July	40,097	15,129	111,677	43,420	31,516	241,839	4,774	12,097	9,516	161	26,548	268,387
August	33,387	14,355	162,644	30,936	20,355	261,677	4,226	12,742	....	1,484	18,452	280,129
September	32,967	9,000	136,633	54,300	32,900	265,800	6,900	22,900	5,367	1,333	36,500	302,300
October	39,936	10,519	137,096	38,160	38,644	264,355	6,613	13,388	11,064	4,419	35,484	299,839
November	23,633	18,900	125,200	41,100	28,200	237,033	2,233	12,533	6,667	2,500	23,933	260,966
December	29,774	15,387	133,742	31,000	23,775	233,678	5,548	16,484	6,613	1,774	30,419	264,097

GROSS PRODUCTION OF CRUDE OIL IN THE UNITED STATES FOR 12 MONTHS

(In Barrels of 42 Gallons)

1929-30—		California	Oklahoma	Texas	Kansas	Arkansas	Louisiana	Rocky Mts.	Eastern	Total
January:	Month	23,385,939	22,575,874	23,412,226	2,861,641	2,453,526	1,807,887	2,076,070	3,439,000	82,012,163
	Daily average	754,385	728,254	755,233	92,311	79,146	58,318	66,970	110,936	2,645,554
February:	Month	22,300,707	20,464,164	20,816,209	2,557,968	2,154,194	1,569,930	1,965,856	3,113,000	74,941,828
	Daily average	796,454	730,863	743,484	91,356	76,936	56,068	70,202	111,184	2,676,494
March:	Month	24,324,729	20,338,262	24,358,592	2,951,076	2,303,734	1,756,153	2,195,823	3,586,000	82,314,369
	Daily average	784,669	672,202	785,761	95,196	74,314	56,650	70,838	115,677	2,655,302
April:	Month	23,295,060	20,235,390	23,493,097	3,112,740	2,188,680	1,702,497	2,085,030	3,524,000	79,636,494
	Daily average	776,502	674,513	783,102	103,758	72,956	56,750	69,501	117,467	2,654,550
May:	Month	24,053,351	21,345,453	24,439,101	3,665,099	2,220,158	1,713,261	2,252,522	3,879,000	83,617,945
	Daily average	775,915	688,563	789,965	118,229	71,618	55,267	72,262	125,129	2,697,353
June:	Month	24,624,627	20,561,112	24,698,029	3,636,150	2,112,270	1,699,581	2,180,752	3,887,000	83,399,521
	Daily average	820,821	685,371	823,267	121,205	70,337	56,653	72,692	129,567	2,779,984
July:	Month	26,796,627	22,371,925	26,969,989	3,867,157	2,137,047	1,716,488	2,360,836	4,439,000	90,659,069
	Daily average	864,407	721,675	869,997	124,747	68,937	55,370	76,156	143,200	2,924,486
August:	Month	27,233,353	22,429,522	27,491,362	3,816,555	2,086,083	1,764,973	2,478,016	4,363,000	91,662,864
	Daily average	878,495	723,532	886,818	123,115	67,298	56,934	79,936	140,742	2,956,866
September:	Month	26,104,264	21,299,490	26,067,065	3,780,690	1,959,720	1,718,250	2,347,020	4,075,000	87,351,499
	Daily average	870,142	709,983	868,902	126,023	65,324	57,275	78,234	135,917	2,911,716
October:	Month	26,895,160	20,821,646	26,412,167	3,429,468	2,000,027	1,956,326	2,392,952	4,482,000	88,389,746
	Daily average	867,586	671,666	852,004	110,628	64,517	63,107	77,192	141,358	2,851,282
November:	Month	21,317,540	19,193,760	24,896,034	3,430,560	1,911,060	1,853,566	2,350,110	4,029,000	78,981,629
	Daily average	710,585	639,792	829,868	114,352	63,702	61,785	78,337	134,300	2,632,720
December:	Month	21,705,554	20,092,876	25,609,832	3,549,066	1,917,071	1,878,352	2,378,754	4,168,100	81,399,596
	Daily average	700,179	648,156	826,124	114,486	61,841	60,592	76,734	134,455	2,622,568
	Total 12 months	292,036,911	252,229,474	298,713,694	40,658,170	25,443,570	21,137,263	27,063,541	46,984,100	1,004,266,723
	Daily average	800,101	691,040	818,394	111,392	69,708	57,910	74,147	128,724	2,751,416

SERVICE

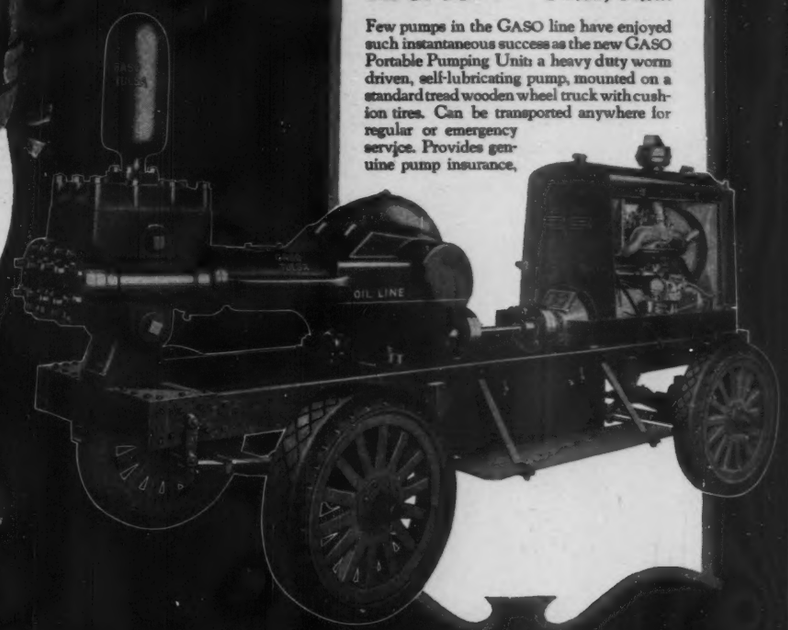


SERVICE, always important, becomes doubly important when urgently needed. It is then that our location, in the heart of the oil industry, performs its most important function. Pumps and parts sent from Tulsa are on the job and working by the time shipments from other points get under way.

Combine this advantage with GASO quality and you have a simple explanation of GASO leadership.

GASO PUMP & BURNER MFG. CO. •• *Tulsa, Okla.*

Few pumps in the GASO line have enjoyed such instantaneous success as the new GASO Portable Pumping Unit: a heavy duty worm driven, self-lubricating pump, mounted on a standard tread wooden wheel truck with cushion tires. Can be transported anywhere for regular or emergency service. Provides genuine pump insurance.



GASO PUMPS

for every oil industry need

STEEL

Only the finest quality alloy steel is used in the manufacture of Hughes Rock Bits and Cones. This steel is purchased from a reliable source with the variation in chemical analysis specified.

All vital parts are made from specially selected steel bars that have passed an exceptionally rigid inspection for metallurgical defects, both by the manufacturer and by Hughes Tool Company.

Use HUGHES Rock Bits & Cones *for Superior Performance*

HUGHES TOOL COMPANY

Service Plants	*Main Office and Plant*	*Export Office*
Los Angeles	HOUSTON,	Woolworth Bldg.
Oklahoma City	TEXAS	New York City